FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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TO OUR READERS.

The Supply of "FLIGHT." Important Notice.

Order "FLIGHT" to be either delivered or reserved for you regularly.

As the demand for "FLIGHT" is so great each week, it is of the utmost importance that readers should place their orders *firmly* for copies of "FLIGHT" at the bookstalls, their newsagents, or direct from the publishers, at 44, St. Martin's Lane, W.C., if they wish to secure a copy every week and avoid disappointment. The stringent Government restrictions in regard to the supply of printing paper necessitates this precaution in order that only actual numbers required are printed, and all wastage by unsold copies may thereby be reduced to a minimum, if not eliminated.

THE PUBLISHERS.

EDITORIAL COMMENT.

The Powers of the New Air Ministry.

SINCE it was announced last week that the Air Board was to undergo a complete process of reconstruction, with Lord Cowdray as its Chairman (*sic*), a great deal of comment has been passed in the Press upon the known and unknown intentions of the Government in relation to the reconstructed body. On the whole, we would have preferred that comment and criticism should be withheld until some further public pronouncement had been made as to those intentions; but several things have transpired that make it very desirable, from the public point of view, that the matter should be discussed before an open official commitment is made.

The first and most important question that falls to be discussed is that of the exact power and scope of the new authority. In common with most people who have made the study of aerial policy their own, we believed that the new Board was to be an independent authority, with all the powers of any other Government department. We are not officially told as yet that this is not to be the case, but, on the other hand, there does seem to be a danger that it may be, to all intents and purposes, a sort of glorified committee of the already over-burdened Ministry of Munitions. The idea is abroad, rightly or wrongly, that the main business of the Air Board will be to design machines for the Ministry of Munitions to make. In order to get over the conflict of interest and opinion that must inevitably result from the adoption of an unsound system as this undoubtedly is, it is proposed that the department of the Ministry of Munitions concerned shall be housed under the same roof as the Air Board. As a remedy for the administrative difficulties inseparable from divided control, this strikes us as approaching the farcical. Apart altogether from this aspect of the matter, we have still to learn that our Air Service troubles have their main root in matters of design. It is production that requires to be co-ordinated and accelerated. Design should take, figuratively speaking, care of itself.

If we read the intentions aright, then, the first result of the new order of things will easily be to actually retard rather than to speed up the development of the Air Services. We get rid of one kind of inter-departmental strife only to instal another in its place. We cannot but view anything in the way of divided control of the kind foreshadowed with the gravest disquiet. It may be that we and the other critics of the new scheme have failed to grasp their real purport, but we are afraid that is not the case, since active steps are already in progress for giving effect to that divided control to which we have recorded our strong objection.

To go back a little, it will be remembered that the recent controversy over the old Air Board had its genesis in the competition between the two fighting Services. Each of them was concerned primarily in the equipment of its own Air Service, with very little regard to the needs of the other, and, consequently, production was retarded and prices often inflated by the unhealthy competition. The way out was thought to be through the constitution of an Air Board which should take over control of all matters affecting the supply of machines and equipment for both Services, and, collaterally, to deal with such questions of design as experience might suggest would be best considered by an independent body which included representatives of both the Services concerned. That is what we thought we were going to get when the new Government took in hand the reorganisation of the Air Board. As a matter of fact we were justified in assuming that that was so, in the light of the speech of the Home Secretary when announcing the intention to put in hand the reorganisation. What we are to get, apparently, is what we have advisedly described as a glorified committee of the Ministry of Munitions. It certainly does not make for confidence in the future of the Air Services.

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The New Air Lord.

If it were not for the disquieting facts with which we have already dealt, we could view with approval the general scheme of the reorganisation. The Navy is to be put on an equality with the Army at last, in that it is to have a responsible officer to sit in the inner councils of the Admiralty. It has always been a disability of the R.N.A.S. that it was represented only at second hand on the Board of Admiralty, and to that we believe was due in no small measure the attitude taken up by the Admiralty towards the old Air Board. Not only are we unfeignedly pleased that aerial interests are now to be directly represented on the Board, but we feel that every interest concerned will be served by the appointment of so experienced an officer as Commodore Godfrey Paine, C.B., to represent them. He not only brings to bear all the knowledge gained during a long sea service but a unique experience of the Air Service as well. To have appointed an officer with sea service only would have been, we feel, a mistake under all the circumstances. Although it is a part of the Royal Navy and its reorganisation for war, the R.N.A.S. is really a service by itself, and one that requires special understanding and special treatment at the hands of those at its head. The experiment of handing it over to officers who know nothing about it, and who have been bred to the sea and the sea service only, has not been such a conspicuous success that it need be repeated in times like these.

As Fifth Sea Lord—though we do not see why tradition should not be ignored and the new Lord be given the title of his duties—Commodore Paine will be complementary to the Director-General of Military Aeronautics at the War Office.

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Great Minds Thinking Alike!

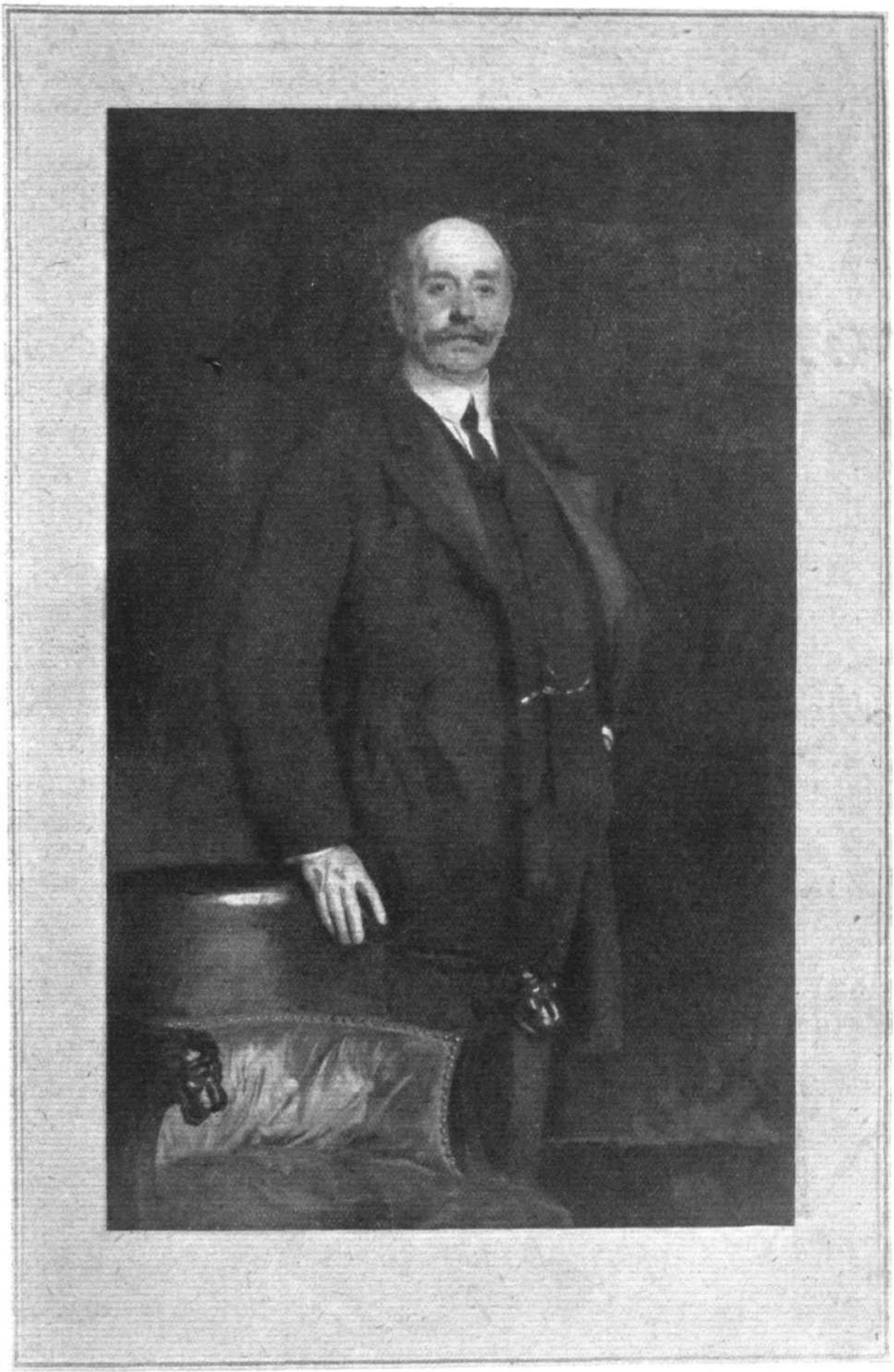
When we read the things that have been written around the reconstruction of the Air Board and cognate matters, it is difficult to repress a smile when we find served up as new discoveries and new ideas the doctrines that we ourselves have been enunciating for two years and more. To quote one example out of many, the naval correspondent of the *Telegraph*, in the course of a very sound article on "The Air Problem," makes the discovery that: "Whatever may be the future development of aircraft, the Fleet will require aeroplanes, if not airships also, as auxiliaries if it is not to fight at a disadvantage. . . . The Fleet needs craft specially designed to meet its needs, and pilots specially trained. That is the Admiralty's business." Exactly. We said so, when discussing the Naval Estimates of 1914!

Then, Mr. Joynson-Hicks, in an interview with the *Observer*, tells his interlocutor:—

"But the most important question for the Air Minister is to decide the question of the use of the machines. On this point I am in advance of many of those who support the creation of an Air Ministry. This is a new force in war. The old naval and military chiefs have not that belief in its independent possibilities that our flying men have.

"I would allow to Sir Douglas Haig and Sir John Jellicoe all the machines they want for their own tactical purposes. But I would give the new Air Minister the power of establishing an independent service for independent strategical operations. Of course, he would have his military staff to advise him. But, to give an illustration, whilst the Army is engaged in a great battle in France or the Fleet in its duties in the North Sea, have either of their leaders time to work out and develop the possibilities of bringing the war to a successful issue by a great strategical air offensive?"

We are, indeed, pleased that so eminent an authority as Mr. Joynson-Hicks is so thoroughly in accord with the opinions we have expressed in the columns of "FLIGHT"! When we say that we are glad, we mean it, for this is an aspect of development in the Air Service in which we have the profoundest belief. From the very earliest developments of aircraft for warlike purposes we have held fast to the idea that it is impossible to altogether divorce the Air Service from the Army and Navy. We have seen in this war how vitally necessary it is that both Services should be supplied with a sufficiency of all types of aircraft for the special purposes required. That must always be a first charge on our resources, but under a Government that is determined to maintain aerial supremacy, and with a real Air Ministry charged with the maintenance of that supremacy, there would be a surplus of production which should be applied to the constitution of yet another service to undertake the work that Mr. Joynson-Hicks speaks of. If our statesmen had been prescient, we should have created such a service in nucleus form at least before the war. How necessary it is that there should be such a separate service we can see day by day when we read of the work of the R.N.A.S. on the distant fronts. The bombarding of bridges far in the interior of Bulgaria and the bombing of blast furnaces in Lorraine is not work within the legitimate sphere of a *Naval* air service. Nor does it fall properly within the scope of a military air service which is attached to an army in the field for purely tactical purposes. It is the affair of a separate service formed and held in readiness for exactly that kind of work, although at all times in close working touch with the other Services. In a word, the functions of the Naval and Military Flying Services are purely tactical, while those of the Air Service proper are just as purely strategical. There is nothing in the idea of the separate service as we visualise it to



The Rt. Honourable Viscount Cowdray of Midhurst, First Air Minister of the world.

THE ADMIRALTY AT THE AIR MINISTRY.—Commodore Godfrey Marshall Paine, C.B., M.V.O., Fifth Sea Lord.

THE ARMY COUNCIL AT THE AIR MINISTRY.—General Sir David Henderson, K.C.B., D.S.O., Director-General of Military Aeronautics.

hinder its units being placed at the disposal of an admiral commanding a fleet or a general at the head of an army when necessary. Again, we are able to see the entire feasibility of the plan when we regard the number of R.N.A.S. squadrons which are working with the armies in the various theatres of war. Most of them are doing tactical work which would be done by Air Service units, setting free the Naval pilots for their own specialised work. It is on the lines suggested, as we have more than once indicated in the long, long past, that the future development of the Air Services will proceed.

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THE ROLL OF HONOUR.

REPORTED by the Admiralty:—

Missing.

Flight-Lt. J. C. Croft, R.N.
Lt. S. R. Hibbard, R.N.V.R.
Flight-Lt. A. S. Todd, R.N.
Flight-Lt. H. C. Vereker, R.N.

Accidentally Injured.

Flight Sub-Lt. B. A. Millson, R.N.
Prob. Flight Sub-Lt. F. S. Russell, R.N.
Sub-Lt. A. F. Wilson, R.N.V.R.

Reported by the War Office:—

Killed.

Lt. C. A. F. Brown, R.F.C.
Lt. E. F. Clark, Buffs (E. Kent), attd. R.F.C.
Capt J. W. W. Nason, R.F.C.
Lt. C. W. H. Parker, Worcester, attd. R.F.C.
Lt. J. K. Robertson, R.F.C.
2nd Lieut. D. J. Taylor, R.F.C.

Died of Wounds.

2nd Lt. E. F. W. Smith, Leinster, attd. R.F.C.

Previously reported Missing, now reported Missing, believed Killed.

2nd Lt. J. L. Pulleyn, Dorset, attd. R.F.C.

Died.

18298 2nd Air-Mech. C. F. Mason, R.F.C.
122474 2nd Air-Mech. J. Murphy, R.F.C.

Wounded.

2nd Lt. H. J. H. Dicksee, R.F.C.
2nd Lt. R. P. C. Freemantle, R.F.C.
Capt. J. R. Gould, Cavalry S.R. and R.F.C.
2nd Lt. W. H. Hubbard, R.F.C.
2nd Lt. L. F. Jones, R.F.C.
2nd Lt. G. A. Masters, London and R.F.C.
2nd Lt. J. P. Morkham, Northants and R.F.C.
Capt. A. H. Smith. R.F.C.
21271 2nd Air-Mech. A. Carmichael, R.F.C.

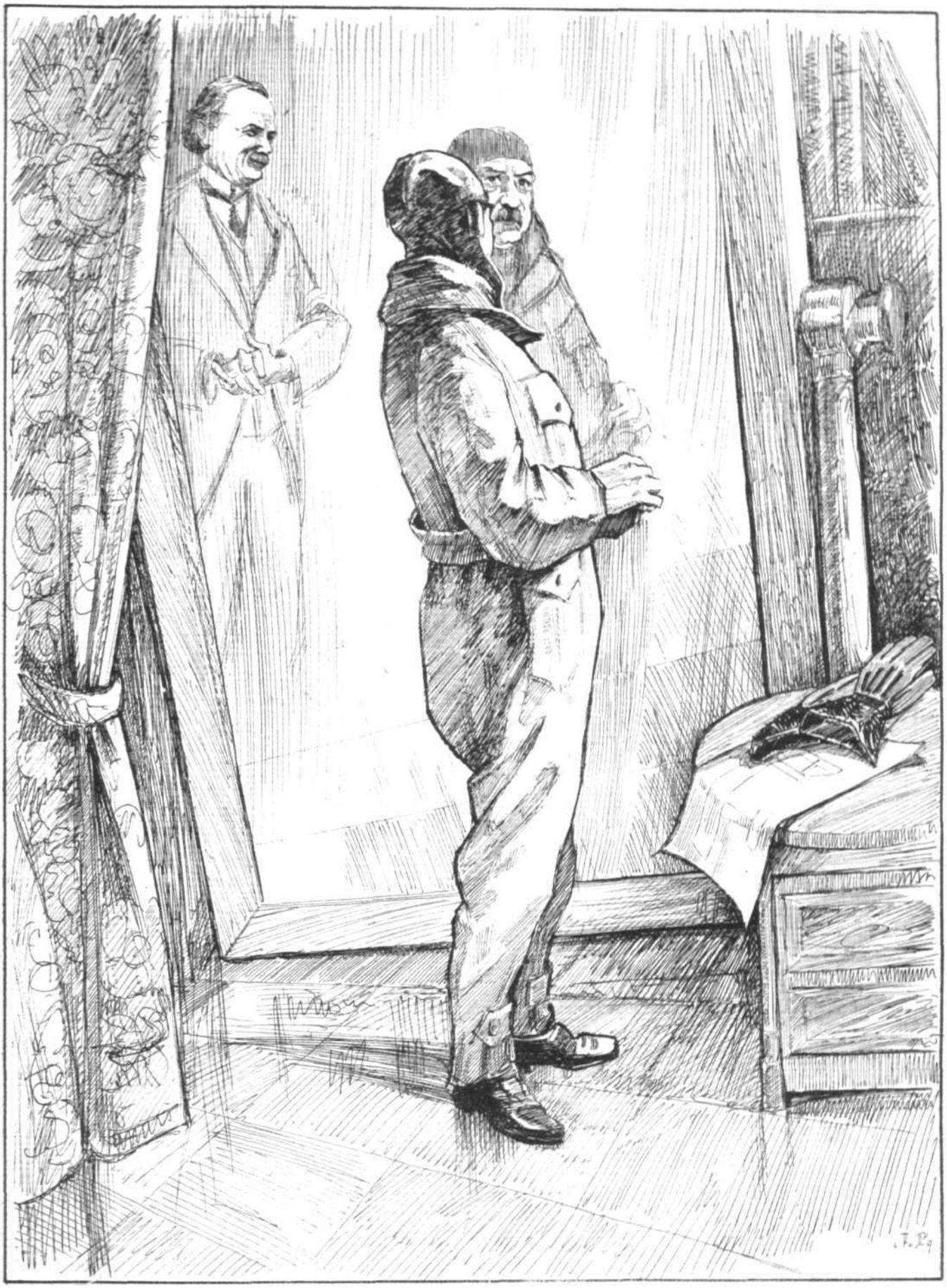
Missing.

2nd Lt. H. E. Arnold, R.F.C.
2nd Lt. F. N. Insoll, R.F.C.
2nd Lt. E. L. Lewis, Essex and R.F.C.
Capt. H. Spanner, R.F.C.

The Air Board.

FOLLOWING upon the announcement set forth in "FLIGHT" of last week as to the appointment of Lord Cowdray as Chairman of the Air Board, and of Mr. Percy Martin and Mr. Weir in regard to the supply of motors and aircraft respectively, notification was subsequently made that Commodore Godfrey M. Paine, C.B., M.V.O., was appointed a fifth Sea Lord, and would represent the Admiralty on the Air Board, whilst Lieut.-Gen. Sir David Henderson, K.C.B., D.S.O., as before, will represent the Army Council.

At the end of last week it was made known that the Hotel Cecil had been commandeered by the Government for the purposes of the Air Board, and the building was formally taken over on Tuesday. The Constitutional Club will, however, remain in possession of the Eastern wing of the building.



TRYING ON THE NEW SUIT.

THE PRIME MINISTER: **Looks like an excellent fit, I think, my Lord.**
AIR MINISTER: **Yes, so long as it does not restrict my freedom of action.**
(THE PUBLIC: **Hear, Hear.**)

MOTOR OUTPUT AT THE AIR MINISTRY.—Mr. Percy Martin, Managing Director of the Daimler Motor Co. and the Birmingham Small Arms Co.

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Dealings in Aeroplane Fabric.

THE Secretary of the War Office, on December 30th, issued the following communication :—

"Notice has been given by the Army Council, under the Defence of the Realm Regulations, of an intention to take possession of all linen yarns with a view to securing sufficient supplies of fabric for aeronautical purposes. The effect of this Order is to prohibit the sale or delivery of these yarns without licence.

"Exception is made (1) in the case of deliveries under existing contracts if a guarantee is given that the yarn is required for Government purposes ; and (2) in the case of yarn sales if they are made at prices based on those prevailing in the Irish market in the fortnight ending 16th December, 1916, and if a similar guarantee is given.

"It may further be stated that the Government intend to requisition large quantities of suitable yarn, and in estimating the cost of production for the purpose of arriving at a price, the price of flax will be assumed to be the price prevailing in the Irish market in the fortnight ending 16th December, 1916.

"Should it become necessary to restrict the use of suitable flax to Government purposes the necessary measures will be taken. The export of flax has already been prohibited. All inquiries and applications for particulars should be addressed to Department D.A.E., 453, War Office, Adastral House, London, E.C."

On January 8th the following announcement was made :—

"A notice has been issued by the Army Council under the Defence of the Realm Regulations with regard to linen yarns. It is announced that the notice of December 30th has no application to yarns spun from flax tow ; and that the exceptions to the Order do not include any yarns suitable for aeroplane linens, dealings in which are absolutely prohibited. Notice is also given of an intention to take possession of all stocks of Courtrai flax or yarns, and an Order has been made requiring all persons holding any stocks of Courtrai flax to make a return with full particulars within four days, which should be addressed to D.A.E.4 S.3, War Office, Adastral House, London, E.C. A further Order has been made providing that flax which might be used for the manufacture of aeroplane cloth must not be used for any other purpose without the permission of the Director of Aircraft Equipment, Adastral House."

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

New Club Premises, 3, Clifford Street, W.

The New Club Premises will be Opened on Monday next, the 15th inst.

New Club Premises Committee.

A Meeting of this Committee was held on Monday, the 8th inst., when the arrangements for opening the new Club House on Monday next, the 15th inst., were completed.

Special Committee Meeting.

A Special Meeting of The Committee was held on Tuesday, the 9th inst., when there were present: Prof. A. K. Huntington (in the Chair), Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Flight-Commander C. F. Pollock, Lieut.-Com. H. E. Perrin (in attendance), and the Assistant Secretary.

Election of Members.—The following New Members were elected :—

2nd Lieut. Alfred Gordon Bond (South Lancashire Regt.).
Flight Sub-Lieut. Austin Frauenfelder, R.N.
Capt. Roy Anthony Furlong Gill (Royal Irish Regt.).
William Stewart-Greene.
Capt. G. P. Grenfell, R.F.C.
Edgar George Gubbins.
Claude Frederick John Newman Gudgeon.
Lieut. Robert Parsons Harvey (5th King's Lancers).
2nd Lieut. Neville Kemsley, R.F.C.
Flight Sub-Lieut. Samuel Marcus Kinkead, R.N.
2nd Lieut. Thomas John Owen, R.F.C. (S.R.).
John Lewis Le Hunte Shedden.
Lieut. Desmond Tuck (attd. French Flying Corps).
Flight-Com. William Lawrie Welsh, R.N.
2nd Lieut. Thomas Philip Whitcomb, R.F.C.

The late Sir George White, Bart.—On the motion of the Chairman, the following Resolution was unanimously passed :—

"The Committee of the Royal Aero Club desires to place on record its deep regret at the death of Sir George White, Bart., who had been a Member of the Club since 1910, and to express its high appreciation of the signal services he rendered to aviation. The Committee further desires to tender its sincere sympathy to the members of his family upon the bereavement they have sustained."

The late Sir Hiram S. Maxim.—On the motion of the Chairman, the following resolution was unanimously passed :—

"The Committee of the Royal Aero Club desires to place on record its deep regret at the death of Sir Hiram S. Maxim, who had been a Member of the Club since 1901, and to express its high appreciation of the signal services he rendered to aviation. The Committee further desires to tender its sincere sympathy to the members of his family upon the bereavement they have sustained."

Subscriptions.

Members are reminded that the Subscription for the year 1917 became due on the 1st January last. Bankers' Order Forms can be obtained on application to the Secretary.

Servants' Christmas Fund.

The Subscription List for this Fund is now open.

THE FLYING SERVICES FUND administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The Fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers, and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W.

Subscriptions.	£	s.	d.
Total subscriptions received to Jan. 2nd., 1917	11,111	9	2
Eric Brown	0	4	0
Total, January 10th, 1917	11,111	13	2

B. STEVENSON, Assistant Secretary.
3, Clifford Street, New Bond Street, W.

Another German Lie Refuted.

THE Admiralty issued the following on January 3rd :—

"A German Wireless Press message as received in the Mediterranean contained the following :—

"'The American Government is raising a protest to Great Britain for allowing British airmen to bombard the station of Drama before the ejected delegates and Consuls had left, in face of the airmen's knowledge that the delegates had to be met at the station. This bombardment, *which, of course, was unsuccessful*, is the latest case in the history of the breach of international law by the alleged protectors of smaller nations.'

"A report which has been received from the Vice-Admiral Commanding, Eastern Mediterranean, giving details of the bombing of Drama (in Macedonia) by British airmen, serves admirably to illustrate, when compared with the German Wireless Press message of December 1st, the methods of the German propagandist. The substance of the Vice-Admiral's report is as follows :—

"The representatives of the German, Austrian, Turkish and Bulgarian Governments when expelled from Athens were sent at their own request, together with their families and servants, by specially-chartered steamer to Kavalla. After being landed a request from the German Minister was conveyed to the Thasos air station asking that the Drama–Kavalla road might not be bombed for 24 hours from 6.45 a.m. on November 25th, as it was being used by women and children belonging to the evicted enemy Legations.

"The Commanding Officer of Thasos air station not only complied with this request, but, as a further act of grace, refrained from any operation against Drama Station and aerodrome until the 28th, when both were bombed with effect. The only attack made on the 25th was upon the Drama aerodrome alone, and was carried out before the message from the German Minister reached the Allied air station at Stavros. No bombs were dropped in or near the town nor in the vicinity of either the station or the Drama–Kavalla road. This report was substantiated by photographs."

Fatal Accidents.

A SECOND death in connection with the fatal accident at Bristol on January 2nd, recorded in our last issue, has occurred, Lieut. F. Bissicks, R.F.C., dying in hospital from his injuries. At the inquest on the other officer, 2nd Lieut. J. E. Townsend, it was stated that he was undergoing instruction on a dual control machine at the time. Verdicts of "Accidental Death" were returned in both cases.

"Deaths from Misadventure" was the verdict of a Kentish jury on January 3rd on Lieut. McGwyre and Sergt. Wilks, R.F.C., who were killed on the previous day. It appeared from the evidence that when at a height of 1,000 ft. the machine turned too suddenly, and when the engine stopped the pilot lost control.

An aeroplane fell from a great height, and the pilot, a Canadian, named Platt, was killed near Wallsend on January 4th. The machine caught fire and was totally wrecked.

Capt. Mowatt, an inventor, was killed while at flying practice in Northumberland.

ARMCHAIR REFLECTIONS

by the "Dreamer"

IT is not surprising that one of the side-lines in the business of gaining a living—and a good one at that—even when trade is bad, has received an enormous fillip as a result of the war. Crystal-gazing, palmistry, black mirror seeing, the supposed converse with spirits called up to order like servants, and all the hundred-and-one things rolled into one and called "fortune telling" by the police, is having a remarkable run, and its exponents brought to book as opportunity offers.

Even in peace-time there are quite enough of the credulous in the number required to make the population of London, to provide these soothsayers with a fat living and a bit over towards inevitable trouble when the man in blue arrives. In such a time as we are passing through thousands of anxious relatives will try anything and everything before giving up hope of ever gaining news of their lost ones, wherefore the money extracted assumes colossal proportions. Colossal that is, having regard to the skill (?) required and the initial outlay for stock-in-trade, or fittings, or flapjack or whatever you care to call it. Stock-in-trade, of course, there is none. Nothing is sold except bunkum, and the cash received represents 100 per cent. profit, less the rent of two rooms.

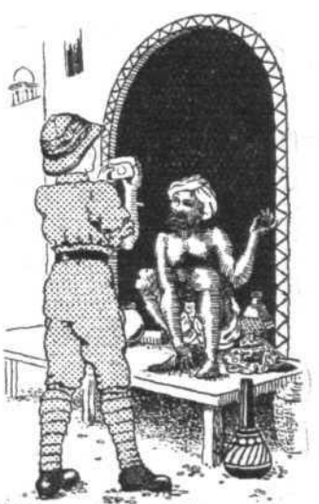
Plenty of black velvet, deep ruby and gold hangings, an Oriental table and carpet, a pack of cards, a crystal, a mirror that looks like a sheet of "Buffalo-plate," used to glaze photographic prints on, and there you are. There you are. If you are a woman you must have a foreign voice, natural or acquired, plenty of cheek, no pity, and dress in kimonos and fallals till you look like everything on earth. Ditto, ditto, if you are a man, until you look like nothing on earth.


Spirits Called up to Order

The difficulty surrounding the whole swindling business is that these charlatans have a certain modicum of the voice of scientific support on their side, thus making their detection and consequent punishment very hard to bring about, except by the use of decoy birds by which to trap them.

For there is something in palmistry, something in so-called spirit impressions, something in crystal-gazing. To gaze into a crystal sphere and pretend to see there actual physical happenings of the past, present or future, is the acme of foolishness, but if so be you are of the right temperament there are pictures to be seen. I've seen them, and will admit that I am rather fond of the experiment. "How," you will ask, "is it possible to see pictures—and changing pictures at that—in a simple globe of pure white glass?" My answer is, Have you never sat in a darkened room and seen pictures, changing pictures, in the glowing embers of the firelight? There you have the whole thing. If you have the temperament, or perception, or building power, or, if you like, imagination, to see pictures in the fire, you may see them in the crystal. If you have not this ability then you are the poorer by one of the most comforting and soothing old-world pastimes ever handed down through the generations.

There is no hidden mysterious power in the crystal; it is simply a convenient object into which to gaze. I can think of no other material in any shape or form that is so convenient. It is bright and it is dark. It has wonderful surface reflecting powers, and it has unfathomable depths of lustre, girt about by darksome caverns wherein fancy may find —— just what it seeks to find. One cannot see pictures in an old tobacco pouch or a coal-scuttle. The human brain is a funny contraption, and I get no commission on the sale of crystal globes, so you need not try if you don't want to. But many a weary traveller, hundreds of miles from the nearest civilisation, has seen, over a pipe of tobacco, the pictures you may deny, in the camp fire.


Tinned Envelopes

Strange, as a matter of fact I set out to write about something entirely different to crystal-gazing. It was about a letter I have to-day received from an old colleague now serving his country right away up on the frontier of Northern India. He mentioned gazing into the future, and that and the present energetic routing out of the swindling "seer" in London connected themselves up in my brain and led me off into a long tirade on something I know very little about.

This journalistic friend of mine amuses himself in his leisure time, and keeps his hand in against the time when he will return, by writing me letters which I wish I could reproduce here in full for my readers' benefit. Unfortunately the price of paper is different here to what it appears to be there, judging by the length of his impressionable communications, and so it

is taboo. "Who," he asks, "could have gazed into the future ten years ago, and have seen aeroplanes flying up and down the frontier line on the look-out for raiding hill-men, in this little spot 40,000 miles from nowhere?" And I will answer him, "Who? even with the aid of a crystal globe."

Then he poses me with a direct personal question, as to whether when I was reading of the early experiments of Count Zeppelin, I ever thought I should one day trample underfoot in a quiet village in Essex one of his most up-to-date machines? No, I did not, and as I do not happen to wear seven-league boots, I have not done so now, but I have trampled some of it, thank goodness.

As a side issue he tells me that he is studying Hindustanti so that he can entertain me on his return, and advises me to get used to the sound of the pronunciation, going on to say that it is something like a cat and dog fight intermixed with the sound of a Ford car going at full speed over a bumpy road. He conveys the information that he can already ask over the counter in the native tongue for a packet of envelopes, and although the native sometimes gives him a tin of sardines in tomatoes instead, he is not going to be discouraged. What I am most afraid of is that he will some day take a fit and write to me in that language.

When I have got time I shall gaze into that crystal globe to see whether there is going to be anything doing.

MENTIONED IN DESPATCHES.

IN the long list, dated November 13th, 1916, published in a supplement to the *London Gazette* of January 2nd, of names of officers, non-commissioned officers and men serving, or who have served, under his command, and whose distinguished and gallant services and devotion to duty Field-Marshal Sir Douglas Haig considers deserving of special mention, there are the following connected with the Flying Services :—

STAFF.

Temp. Brig.-Gen. E. B. Ashmore, R.A.
Temp. Brig.-Gen. L. B. Boyd-Moss, S. Staff. R.
Temp. Brig.-Gen. H. R. M. Brooke-Popham, Ox. and Bucks L.I.
Temp. Major A. Christie, R.A. and R.F.C.
Temp. Brig.-Gen. J. F. A. Higgins, R.A.
Temp. Brig.-Gen. C. A. H. Longcroft, Welsh R.
Temp. Brig.-Gen. D. C. G. Pitcher, Ind. Army.
Temp. Major-Gen. H. M. Trenchard, A.D.C., R. Scots F.
Temp. Brig.-Gen. T. I. Webb-Bowen, Bedford R.

THE ROYAL FLYING CORPS.

Naval Wing.

Flight Sub-Lieut. W. P. C. Chambers, R.N.

Military Wing.

Temp. Capt. J. O. Andrews, R. Scots.

Temp. Capt. A. Ball, Notts and Derby R.; Temp. Lieut.-Col. J. H. W. Becke, Notts and Derby R.; Temp. Lieut. E. M. Bettington, Gen. List; Lieut. F. Billinge, Manch. R., S.R.; Temp. Lieut.-Col. C. Bovill, R.A.; Temp. Major H. le M. Brock, R. War. R.; 2nd Lieut. J. B. Brophy, S.R.; 2nd Lieut. P. R. Burchall, S.R.; Major A. B. Burdett, York and Lanc. R.; Temp. Capt. G. A. Burney, Sco. Horse (killed); Temp. Capt. P. A. Byrne, R.F.A.

Temp. Major T. A. E. Cairnes, Dn. Gds.; Temp. Major J. A. Chamier, Ind. Army; Temp. Capt. H. B. T. Childs. S.R.; Temp. Major F. H. Cleaver, Special List; Temp. Capt, G. L. Cruikshank, Gord. Highrs.; Temp. Capt. S. A. Currin, S.R.

Temp. Capt. C. J. W. Darwin, Cold. Gds.; Temp. Lieut.-Col. R. C. Donaldson-Hudson (T.F. Res.); Major A. S. W. Dore, Worc. R.; Temp. 2nd Lieut. E. Drudge; Temp. 2nd Lieut. J. D. Drysdale, Gen. List.

Temp. 2nd Lieut. H. C. Evans, Gen. List; Capt. L. F. R. Fell, S.R.; Lieut. L. Findlater, Manch R.; S.R.

Temp. Major P. E. L. Gethin, S.R.; Major A. L. Godman, York. R.; Temp. Capt. A. Goodfellow, S.R.; Temp. Lieut. E. G. S. Gordon, High. L.I.; Temp. Capt. A. L. Gordon-Kidd, Dn. Gds.

Temp. 2nd Lieut. A. K. Hall, Gen. List; Temp. Capt. W. B. Hargrave, Suff. R.; Temp. Capt. W. R. E. Harrison, Gen. List; Temp. Lieut.-Col. J. G. Hearson, R.E.; Temp. Lieut.-Col. P. L. W. Herbert, Notts. and Derby R.; Temp. Lieut.-Col. C. G. Hoare, Ind. Army; Temp. Capt. G. B. Hodgson; Temp. Lieut.-Col. A. Huggins, S.R.; Temp. Lieut. P. B. Hunter, A.S.C.; Temp. Major G. B. Hynes, R.A.

2nd Lieut. G. Jacques, S.R.; Temp. Lieut. R. Johnstone, Gen. List.

2nd Lieut. M. Keegan, R. Dub. Fus.; Capt. J. U. Kelly, Wilts. R.; 2nd Lieut. A. G. Knight, S.R.

Qmr. and Hon. Lieut. G. Laing, (Temp. Capt. in Army); Temp. Capt. J. Latta, S.R.; Temp. Major G. A. K. Lawrence, R.A.; Temp. Lieut. C. M. Leman; Temp. Lieut.-Col. E. R. Ludlow-Hewitt, R. Ir. Rif.

2nd Lieut. G. R. McCubbin, S.R.; Temp. Major W. F. MacNeece, R. W. Kent R.; Temp. Major P. C. Maltby, R. W. Fus.; Qmr. and Hon. Lieut. A. H. Measures (Temp. Capt. in Army); Temp. Capt. A. M. Miller; Temp. Major J. T. C. Moore Brabazon, S.R.; Capt. A. M. Morison, S.R.; Temp. Lieut.-Col. C. F. de S. Murphy, R. Berks. R.

Temp. Capt. G. H. Norman.

Temp. Capt. E. B. Palmer, A.S.C.; Temp. Capt. A. H. Parker, Gen. List; Temp. Lieut. C. E. M. Pickthorn, A.S.C., S.R.; Temp. Major E. W. Powell, unattd. List (T.F.).

Temp. Capt. J. C. Quinnell, R.A.

Temp. 2nd Lieut. D. L. Reed, Notts. and Derby R.; Temp. Capt. G. V. Rice, R.F.A.; Temp. Lieut. A. T. Rickards, R.A.; 2nd Lieut. C. A. Ridley, R. Fus.; Capt. H. M. M. Robertson, R.F.A.; Temp. Capt. V. A. H. Robeson, S.R.; Temp. Major A. Ross-Hume, Sco. Rif.

Capt. W. D. S. Sandy, S.R.; Temp. Lieut.-Col. G. S. Shephard, R. Fus.; Capt. J. de L. Simons, R.A.; Temp. Capt. R. D. Simpson; 2nd Lieut. C. G. Smith, S.R.; Major S. Smith, R.F.A.; Temp. Major M. Spicer, North'n. R.; Capt. D. E. Stodart, S.R.

Temp. Major F. F. Waldron, Hrs. (killed); Capt. H. N. Walker, Welsh R.; 2nd Lieut. B. W. Watts, S.R.; Temp. Capt. G. L. Wightman, Gen. List; Temp. Capt. A. M. Wilkinson, Hamps. R.; Temp. Major P. K. Wise, R. War. R.

2nd Lieut. W. B. Young, S.R.

Flight-Sergt. C. Armand; Flight-Sergt. M. W. Arnot; Corpl. T. A. Bates; Corpl. C. A. S. Brittenden; Flight-Sergt. A. S. Cardno; Corpl. J. W. Dean; Sergt. C. E. Downie; Flight-Sergt. J. R. Fisher; Pte. T. B. Jones, Canadian Corps Cav. Regt.; Acting Sergt.-Major J. M. Knight; Acting Sergt. C. H. Lawrence; Flight-Sergt. W. A. Lord.

Sergt. W. P. McElwee; Flight-Sergt. G. Marriner; Corpl. G. T. Masters; Flight-Sergt. N. Moore; Sergt.-Major W. E. Moore; Corpl. C. H. R. Morris; Flight-Sergt. C. W. Murton.

Acting Sergt.-Major E. S. Olney; Corpl. H. L. Pountney; Sergt. A. H. Read; Flight Sergt. B. Reynolds; Flight-Sergt. C. Saunders; 1st Air-Mech. F. F. Saunders; Flight-Sergt. W. A. C. Snook; Flight-Sergt. L. Spencer; Sergt. W. Thaw; Acting Sergt.-Major G. Thornton; Acting Sergt.-Major W. G. Turner; Sergt. J. Watts; Flight-Sergt. H. Webb; 1st Air-Mech. L. Wright.

Distinguished Service Medals for R.N.A.S.

THE following awards of the Distinguished Service Medal were announced in the *London Gazette* of January 1st :—

P.O. Mech. C. E. COBB, R.N.A.S., O.N., F4623.

P.O. Mech. D. MCLEAN GRAHAM, R.N.A.S., O.N., F4625.

Military Medal for R.F.C.

IN the list of awards of the Military Medal for bravery in the field, announced on January 7th, appears the following :—

6640 1st Class Air-Mech. H. ALEXANDER, R.F.C.

AIRISMS FROM THE FOUR WINDS

"WAKEFIELD, Mayor, made no mistake during his Mayoralty," must be a very gratifying judgment upon Sir Charles Wakefield's year of office as Lord Mayor of London, for him to hand down to his heirs. This little inscription was upon the silver porringer, a quaint relic in itself dating back to 1719, presented to Sir Charles last week by the Court of Assistants of the Cordwainers' Company, of which ancient body he is immediate Past-Master. An illuminated address from the inhabitants of the Ward of Bread Street, moreover, set forth more at length the appreciations of the subscribers of Sir Charles' great qualities, Lady Wakefield's unrelenting help throughout the year being included in this parchment address.

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WITH Professor von Parseval as sponsor for the statement, in a recent German article upon the development of aerial navigation, that there is now very little external difference between his system of construction and those of Zeppelin and Schütte-Lanz, another interesting point in airship history is reached. The Professor's views are that the size of airships has considerably increased in order to correspond with the increased useful load and climbing power required. As regards the increase of speed, the pleasing discovery has been made that Newton's Law, according to which resistance varies as the square of the speed, does not apply. The difficulty of increasing the speed of an airship is that additions to the weight of the frame are not compensated by proportionate increase of the carrying capacity of the ship—a fact which must ultimately limit increase in size.

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NEXT comes an acknowledgment of the real use of airships as opposed to the piratical visits and base uses to which these Leviathans of the air have hitherto been so largely put by the Huns. The chief duty of our airships, Herr von Parseval says, is reconnaissance over the North Sea. In this aeroplanes cannot take their place, since they, and in particular, seaplanes with their heavy floats, can remain in the air so comparatively short a time, and obviously cannot accompany the Fleet independently as airships can, but need special mother ships. In this respect the German Fleet is at present superior to its adversaries.

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BY way of conclusion, the Professor opines that when peace breaks out the learned will eagerly study and write and draw interesting conclusions in important books, while the ignorant will tell of the great pilot Boelke who overcame 40 adversaries before he met a malignant fate.

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MONDAY next, January 15th, marks another point in matters aerial. The new House at 3, Clifford Street, New Bond Street, of the Royal Aero Club, opens its doors to the members.

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NEEDS must when the Devil—in this case the Kaiser—may as well be bracketed—drives. So it comes about that the course of lectures on aeronautics which the Battersea Polytechnic were proposing to hold has had to be cancelled. The reason for this is that the services of the lecturer, Mr. Judge, have been requisitioned by the Government in connection with the war, and he cannot proceed further with his lecture work. Prospective students please note.

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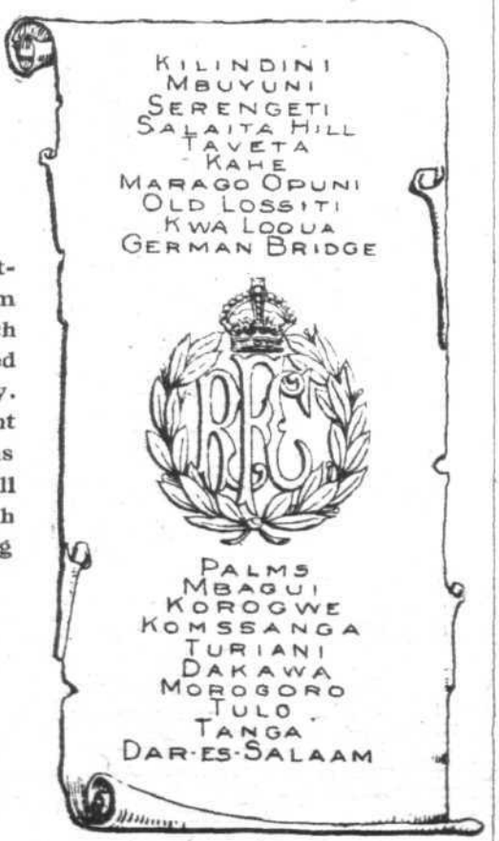
THERE are no complaints Birmingham way in regard to the Zepp. lighting regulations. Quite the other way, in fact. In a report submitted last week to the Judicial Sub-Committee of the Watch Committee of the Birmingham Corporation, which has been considering the question of modifying the lighting arrangements, it was stated that the present arrangements meet the entire approval of the military authorities, who ask that there shall be no relaxation of the

An R.F.C. Christmas greeting from South Africa, which has just reached the old country. Note on the right the string of towns already on the roll of the South African Flying Unit.



Lighting Order, and that Birmingham is held up by the Watch Committee of Sheffield and other large towns, as well as by the military authorities, as a model of darkness.

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AMONG those "mentioned" in the Despatch of Field-Marshal Sir D. Haig, is Major-General J. E. Capper, who will, as Col. Capper, be remembered as the commandant of the old Army Balloon Factory at Farnborough, and a very enthusiastic and hard-working member of the Royal Aero Club Committee.

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THERE always was plenty of Air about the Hotel Cecil. It might well be termed the Meeting-Place of the Winds. So, perhaps, it is but fitting that this Jabez Balfour caravanserai should become the resting-place of the Air Ministry. As the commandeering will not create any constitutional disturbance, the peaceful "annexation" of the building starts with favourable imperial prospects. There should be room here for even so rapidly a growing power as Aviation for quite a long time—as time goes in things aeronautic—say, three to six months. Then there is quite a convenient annex handy in the Savoy, by just throwing a bridge across the "cutting" between the two.

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BY the bye, for experiments while you wait, that "cutting" might well be used as a wind tunnel. Try it one breezy day *via* the "Coal Hole" in the Strand, and find out for yourself what your rate of flow is against the stream.

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IT's an ill-wind, &c. Exclusive Bloomsbury is reported to be quite inflated through the Cecil air upheavals.

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IT used to be said that the Kaiser had promised dire punishment for any Zepp. commander if he should by accident or design put the House of Commons out of action, but it is now reported by the *Tägliche Rundschau* that Carl Peters suggests the sending of large numbers of Zeppelins to destroy the House of Commons, "because so many lies are told there about Germany." He considers that such a course would have more effect in diminishing the war spirit of the British than any number of German victories in Flanders.

WE wonder why. Does he imagine that if, by such a method, the membership of the House of Commons were reduced by a good round number, the entire British nation would necessarily go into eternal mourning. A shake-up of the ballot-box that way might do a mighty lot of good. Ask P.B. and one or two more that we wot of *their* opinions.

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"THEY have developed some powerful aeroplanes, to which we shall very speedily be able to reply." "They" are the Huns, "we" are ourselves, and the prophetic speaker is Lord Northcliffe to a Press representative, upon his impressions of a visit last week to the Western Front. So mote it be.

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THE National Advisory Committee for Aeronautics (of America) has deemed it necessary to amend and add to the nomenclature for aeronautics. Here is one of the "amendments":—"A right-hand engine is one in which, when viewed from the output shaft, looking toward the output-shaft end, the shaft is seen to rotate clockwise." We always did have our doubts about those right-handed engines. Thank goodness, *now* we know.

TEN YEARS AGO.

Excerpts from the "Auto." ("FLIGHT's" precursor and sister Journal) of January 12th, 1907. "FLIGHT" was founded in 1908.

THE DE LA VAULX AIRSHIP GOES OUT ONCE MORE.

The first airship to ascend in 1907 was the De La Vaulx machine, which took the air at half-past three on Monday last, January 7th, with the Count de la Vaulx and M. Maurice Mallet on board. There was a pretty brisk S.S.W. wind, and on first starting the airship was allowed to drift a certain distance, but the Count de la Vaulx almost immediately brought the propeller into operation, and the great vessel went round and came up into the wind with perfect success. A number of more or less complicated evolutions were carried out in the fog at a distance of about 100 metres from the ground. The Count de la Vaulx is very satisfied in every way with this short trial of his airship, although the test only occupied some ten or twelve minutes. An important point is that the gas vessel of the airship, which cubes 725 metres,

FROM ABOVE.—AN INTERESTING PHOTOGRAPH TAKEN FROM THE AIR.—The flying "grounds" of the Philadelphia Aviation School at Essington, photographed from one of the school machines. This school was organised by Mr. Robert Glendinning, the Philadelphia banker, and during the past season thirty-two pupils have received training at the school. Three of the flying boats will be seen on the slipway between the sheds, while a fourth is just getting off.—*Photo. by courtesy of "Aerial Age."*

has been fully inflated for 18 days. There was no need to throw out the ballast except to modify the descent. In fact, only 85 kilogs. of ballast was carried.

AMERICAN AERO CLUB'S EXHIBITION.

By the American Aero Club's section of the A.A.C.'s New York Show last month the universal interest in aeronautics is well illustrated. Interest, however, chiefly centred in the 4-cylinder 4-stroke water-cooled engine built by Messrs. Orville and Wilbur Wright, of Dayton, Ohio, for use with their aeroplane. This motor has cylinders of cast iron, with a bore of 4¼ and a 4-in. stroke. The engine weighs complete 160 lbs. The cylinders are mounted in an aluminium crank-case and jacketed with sheet aluminium. The inlet-valves are automatic, and both valves are situated in the heads of each cylinder. Low-tension ignition is employed with a timing device, and the connecting-rods are made of hollow steel tubing, while the flywheel, which is not very heavy, is solid throughout. In spite of the fact that the engine looks rather heavy, it only weighs 5 lbs. to the horse-power.

CAPTAIN FERBER'S PROJECTS.

Capt. Ferber, of the French Artillery, who is well known as one of the most scientific experimenters in aeronautics on the Continent, and who is understood to have accomplished free flight with a gliding aeroplane, has obtained leave from the French military authorities for the special purpose of carrying his experiments further.

Answers to Correspondents.

[As a number of letters have reached us lately which were signed with initials only, and some of which did not give a complete address, we should like to point out that such communications cannot be dealt with in our columns. Full name and address should always be given, and will not be published.—ED.]

T. P. (Westminster).

The weight of the 128 h.p. Mercedes engine is approximately 600 lbs. without the radiator. As to the propeller fitted on the machine you mention, we have no information, but should estimate the weight at something like 34 lbs.

Flight-Sergeant F. J. S. (R.F.C.).

The word "empennage" literally means feathering, and is used in relation to aeroplanes to indicate the tail surfaces. Empenner, of which empennage is the noun, means to feather an object, such as, for instance, an arrow, to give it directional stability. The term can, we think, be used for all types of tail planes, although probably it would not be strictly correct as applied to a "lifting" tail.

The construction of a wind tunnel, even in a comparatively small size, would be a somewhat costly undertaking, and as we gather you do not so much require a tunnel in which the forces on various bodies can be measured, as one in which the flow of a fluid around the bodies can be seen we should think that a small water channel would be more suitable for your purpose. At the N.P.L. channels of this type are used for photographing the flow of water around different bodies. As you only want a channel for the visual study of flow, a less elaborate arrangement would probably be sufficient. The small N.P.L. water channel consists, briefly speaking, of a trough 3 ins. wide, 4 ins. deep and about 10 ft. in length, provided with glass windows near the outlet end. The supply is taken from a large tank fitted with a ball valve to maintain a constant head of water. From this tank the water runs into a square box at the inlet end of the channel, the box being fitted with baffle plates so as to act as a "steadier" to the water passing into the channel. The water leaves the channel by a weir, over which it flows into a box fitted with an outlet pipe. By introducing some colouring matter, such as red ink, in frout of the model, the flow around the model can be easily seen.

If you are interested in air channels you should apply to the custodians of the South Kensington Museum, who would, we feel sure, show you the small channel at that Museum.

N. E. (North Shields).

Write to Major Mitchell, The Polytechnic, Regent Street, London, W., for the R.F.C., or to the Wireless Officer, Talbot Works, Barlby Road, Kensington, W., for the R.N.A.S. It is possible to join the R.F.C. Cadet Corps as a civilian, and you can get particulars regarding this from Adastral House, E.C.

H. A. (High Wycombe).

There is no cadet corps for the R.N.A.S., but if you are accepted for a commission you will be entered as a probationary flight officer and sent to a school for training.

A. B. (Leeds).

It is difficult to advise, as you do not say what age the boy is. He had probably better remain where he is for the present, as if he came to London he would hardly be able to get a better position unless he is exceptionally skilled.

A. B. (Kingston).

The R.F.C. is divided into Flights, Squadrons and Wings. You do not need to be a mathematician to become a pilot. The best book on engines is Burl's "Aero Engines," which can be had from "FLIGHT" offices for 8*s.* 10*d.* post free. A good book for studying the principles of flight is "The Aeroplane," by Hubbard and Ledeboer, which costs 3*s.*

R. T. P. (Parkstone).

You should apply to the Chief Inspector, Aeronautical Inspection Department, Adastral House, London, E.C. The training depends upon the work you would be required for, and the salary upon the grade you are placed in.

G. S. (Clapton).

For full particulars of the R.F.C. Cadets' Battalion, you should apply to the headquarters, Adastral House, London, E.C.

W. N. (Hove).

You are only entitled to the Royal Aero Club certificate if you have carried out the three following tests, in the presence of an official observer: Two flights of at least 5 kilometres (3 miles 185 yards) over a course marked out by posts 500 metres (547 yards) apart, the turns to be made alternately to the right and left so that the flight will be a series of figure 8*s*. One altitude flight, during which a height of at least 100 metres (328 ft.) above the starting point must be attained, the descent to be made with the motor cut off and in full view of the observer. In the first two flights the machine must be brought to rest not more than 50 metres (164 ft.) from a point previously indicated by the pilot.

A. W. N. E. (Abergavenny).

If you are accepted for a commission in the R.N.A.S., the Admiralty will arrange for your training. The minimum age for a commission is 18.

L. H. (Bristol).

The address of the R.N.A.S. recruiting office is Brook Green, Hammersmith. Shall be very pleased to receive the photos.

A. E. D. J. (Edmonton).

Your best course would be to apply to Major Mitchell, The Polytechnic, Regent Street, London, W., giving full particulars of your experience, and enquiring as to whether there are any vacancies.

"Sandy" (Glasgow).

Probationary Flight Officers wear the uniform of Midshipman, R.N., except that the white turn-back, button and button-hole on the collar are not worn, and the anchor on buttons and cap badge is replaced by an eagle. An eagle is also worn on the left sleeve.

A. V. (B.E.F.).

Both the Fokker and Albatros firms build biplanes and monoplanes. The Fokker which caused so much stir some months ago was a monoplane. Most of the Albatros machines in use by the German Army are biplanes.

W. S. (Barrow).

It is not clear what is meant by "ordinary flying man." If you wish to join as a mechanic you should write to Major Mitchell, The Polytechnic, Regent Street, W.; while, if you wish to obtain a commission, the necessary form can be obtained from the R.F.C. Headquarters, Adastral House, London, E.C.

H. L. G. (Bedford).

Send details of the invention to the Inventions Bureau, Ministry of Munitions, Prince's Gate, Westminster, S.W.

FLIGHT

FINAL REPORT OF THE COMMITTEE ON THE ADMINISTRATION AND COMMAND OF THE ROYAL FLYING CORPS.

(*Concluded from page* 18.)

(*a*) 1. "DUD" MACHINES, AND (*a*) 2. INSUFFICIENT ATTENTION TO THE CONDITION OF TRAINING MACHINES.

114. There is room for improvement in these respects. Pilots coming home prefer to fly; and, when not closely watched, have now and again taken risks to which they ought not to be allowed to subject themselves. It is the business of Flight Commanders to see to these matters, and cases have occurred where experienced pilots have been allowed to do as they please. There have also been certain instances where instructors appear to have considered that, for short training flights, a few defects in the condition of the machine and of its equipment are of little consequence. The pupils in training do not care to complain. They are afraid of being accused of "cold feet."

115. Instances of the flying home of "dud" machines were given us. One was of a pilot who, wanting to get home from the front quickly, flew a machine which had a forced landing in France owing to engine trouble; but so anxious was he to get home that he came on and happened to arrive in safety.

116. A bad instance of the neglected condition of upkeep of a school machine was the case of a machine sent from Beaulieu to Hythe for use there as a school machine. (Instance *p*. 10.)

117. Another instance was the failure to provide a pilot with satisfactory light for his instruments on the occasion of his making his first trial night flight.

118. The attention of flight commanders and of squadron commanders should be drawn to the importance of taking no chances even in the shortest and safest flights. Accidents may so easily and unexpectedly happen, although we are not aware of any case in which an accident has, in fact, happened from either of the causes mentioned.

(*a*) 3. "CHRISTMAS TREE" MACHINES.

119. Several witnesses complained that machines had been overloaded with all sorts of apparatus. This sometimes happened in the early stages of the war, when aeroplanes were few and all kinds of work required to be done. The pilots wanted to do it. A pilot thought he might meet a German in the air, so he took a gun. He delights in bomb-dropping, and thought he might see a German battery or column, so he took some bombs. He often had to take wireless apparatus, and sometimes took it on the chance that it might be useful, and he would strap a camera on as well. The machine was so overloaded that it would neither climb fast nor fly fast. This was due to over-zeal on the pilot's part. Individual pilots were stopped when they were seen overloading their machines, and the practice was put an end to early in the war by an order that, of the four impedimenta mentioned, no pilot was to carry more than two at any one time.

(*b*) 1. FAILURE TO BUY AMERICAN MACHINES.

120. The purchase by the Admiralty, at the outbreak of war, of Curtiss machines and engines was a discouraging experience. Considerable inquiries were, however, made in America and in other directions, but the reports were adverse, and the experiment was not repeated, we think wisely.

(*b*) 2. FAILURE TO UTILISE CERTAIN ENGLISH FIRMS.

121. At the outbreak of war the firms known or thought to be capable of building engines were, by arrangement, divided between the Royal Flying Corps and the Royal Naval Air Service. The Sunbeam firm was allotted to the Navy, and have now turned out a good type of high-powered engine.

122. The Vauxhall firm have been employed in making shell for munitions. There is an arrangement with the Ministry of Munitions by which the Vauxhall Company can be released from shell making and take up engine building. The Royal Flying Corps, at the instance of General McInnes, has been keeping the Vauxhall Company in reserve for making the Rolls-Royce engine under licence or the 200 h.p. R.A.F. engine. We see no objection to this, except that we do not think it wise to give further orders for the 200 h.p. R.A.F. ntil it has been more fully proved.

123. The Rolls-Royce case stands thus: The Royal Flying Corps gave them the experimental order for engines to which we have referred. The Admiralty then stepped in and gave them large orders and extended their works. The company then applied to the Royal Flying Corps for further extension. It happened that Messrs. . . . had at that time an engineering shop becoming vacant, with tools and labour ready to hand. General Henderson preferred to try to arrange for Messrs. . . . to build the Rolls-Royce engine under licence, but the terms sought to be enforced by the Rolls-Royce Company were unacceptable to Messrs. . . . and the matter fell through. We think that General Henderson acted quite rightly.

124. It is certainly a wise policy not to depend exclusively upon any one firm for the building of an engine of a given type. Labour trouble, Zeppelin raids, or a variety of happenings, may interfere, and it is better not to have all one's eggs in one basket, especially when the eggs are engines.

125. We are not in a position to express any opinion upon the merits of the dispute between the Rolls-Royce Company and Messrs. . . . ; but the incident indicates one of the difficulties in making the business arrangements necessary for procuring engines of private make in quantity—a difficulty from which engines of R.A.F. design are free.

(*c*) INHARMONIOUS WORKING OF THE REPRESENTATIVES OF THE ROYAL FLYING CORPS AND ROYAL NAVAL AIR SERVICE IN PARIS.

126. In the early days of the war, when both Services were very dependent on the French for supplies of aeronautical material, including machines and engines, two officers were sent to Paris to procure all the supplies they could. One represented the Royal Naval Air Service and one the Royal Flying Corps. Each tried to do his best for his own branch of the Service. This led to their being often in competition with each other and to much friction between them. The friction was the result of the competition. The spectacle presented was unedifying. These two gentlemen acted, and were bound to act, as if they were buyers for rival firms of contractors instead of buyers for a Service divided, truly, into two branches, but, after all, a national service whose efficiency in both branches was equally vital to the nation. Fortunately prices were fixed by the French Government and were unaffected.

127. This vicious system of competition for our aeronautical supplies in France has been altered, and the sensible plan adopted of charging one representative with the duty of buying for both Services. It is to b regretted that this sensible and obvious system was not adopted from the first. The competitive system was no doubt adopted in deference to the jealous desire to keep each branch of the Air Service separate from the other in every respect. We deprecate this feeling, of which we have had several instances, but whether both branches of the Service are to blame, or only one, we are unable to say.

(*d*) ZEPPELINS SHOULD BE RAIDED IN THEIR SHEDS.

128. As to this, suggestions were made that the best way of defending the country against Zeppelin and other airship raids was to destroy the Zeppelins at their bases and in their sheds. There were also other suggestions for raiding industrial centres in Germany. Most people would agree with the suggestion that Zeppelin bases should be raided, if possible, while opinion on the desirability of raiding industrial centres is very divided, and we merely mention the suggestion without comment.

129. The great advance of the German Army into France and Belgium has had the effect of making the journey to many of the Zeppelin bases longer than was anticipated, but we have now machines at the front capable of raiding many of the nearer bases. No doubt, as the higher powered engines now coming forward begin to be delivered in quantities, the Royal Flying Corps will be still better equipped for the purpose, both as to length of range and carrying capacity.

130. The decision as to whether machines should be used for the purpose does not rest with the Royal Flying Corps, who can only act at the front under the orders of the Commander-in-Chief of the Army, and regard must doubtless be had to the demand for aeroplanes for other services.

131. The suggestion appeals to us as being sound, and we make no doubt has been, and will be, carefully considered by the proper authority.

(*e*) DUAL CONTROL.

132. The dual control point is closely connected with the training of observers. The object of dual control is to provide the observers with a control stick or lever so that, in the event of the disablement of the pilot, the observer may be able to fly the machine to some landing place and

land it in safety. Pilots at first objected to dual control on the ground that an observer might be tempted to exercise control while the pilot was himself flying the machine and thus cause accident. This objection is wearing away, and pilots are now becoming reconciled to the idea, and even look upon it with favour. Dual control is more easily fitted to machines which carry the pilot in front, but there is no serious difficulty in fitting dual control to all machines which carry a pilot and an observer. The dual control stick should be detachable with a bayonet socket, and should not be placed in position until the need for using it arises. If dual control is to be effective observers must have some elementary training, at any rate, in flying. Subject to these observations, we agree with the growing feeling in favour of dual control, and do not gather that the heads of the Royal Flying Corps desire to raise any objection. It was wise not to move strongly in the matter until pilots become reconciled to the idea.

(*f*) MAPS, COMPASSES AND ALTIMETERS.

Maps.

133. The question of maps has been unfavourably commented on and some witnesses consider that, if maps had been clearer, pilots would have found it easier to recognise places, and an accident, such as occurred on May 31st last, when Lieutenant Littlewood lost his way and was captured with his machine in Lille, would never have happened.

134. The Directorate have had great trouble in getting suitable maps, owing to the fact that air operations extend over so many different countries, the maps of which differ in style and scale. For instance, in the course of a flight, machines frequently pass over parts of England, France and Belgium. On the whole, though the construction of maps was necessarily rather slow, we do not consider that any fault can be found with the Royal Flying Crops, nor can we attribute the loss of the machine in Lille to the map, which was the same which all pilots flying across to France use, and seems to us reasonably sufficient.

135. Some further adverse comment has been made by witnesses because the maps for the theatre of war have not been constructed on the process by which Lord Montagu has produced maps for air pilots over this country. There are several reasons given why these undoubtedly excellent air pilot maps have not been constructed, and with these we are in sympathy. (*a*) The process was a private invention and quite unknown to the Military Authorities until December, 1915. (*b*) Even if the invention had been known, it could not have been adopted for military pilots, as it is essential, whilst learning to fly, that the latter should use the same type of map as they will find in vogue in the theatre of war. (*c*) To produce maps of the theatre of war on Lord Montagu's play would take time, though it could probably be done. (*d*) The maps, if produced, would be useless owing to its being essential for the purpose of orders, reports, descriptions, &c., that pilots should use the same maps as the Army to which they belong unless Lord Montagu's maps should prove to be suitable for the ordinary work of an Army. This we think possible, although they have not yet been adopted.

Compasses.

136. The provision of a suitable compass has presented very real difficulties, and only quite lately has it been possible to invent a really satisfactory one. It appears that the twisting and turning of an aeroplane are so sharp and sudden that no existing compass was trustworthy in an aeroplane; and it has been urged that an indifferent compass was useless, and that the number of high-class compasses was very limited. There are certainly instances in the earlier days of the war of machines flying without compasses owing to there being none to give them; and, later on, isolated instances due to the negligence or rashness of local officers who were responsible for seeing that a machine was properly equipped before leaving the ground. Some of these cases will be found commented on in this Report.

Altimeters.

137. The complaint that altimeters were limited to registering a height of 10,000 ft., and that they burst if an aircraft rose above that height, appears to be borne out by fact, and, here again, was a surprise of the war. When hostilities commenced 10,000 ft. was considered an ample maximum height, but the range and accuracy of anti-aircraft guns increased, until machines were hit at over 20,000 ft., and the range of the altimeter had to be increased. Consequently there was a period when there were no suitable altimeters for flights above 10,000 ft., but the Committee have no reason to suppose that the period was unduly protracted.

(*g*).—GENERAL HENDERSON OPPOSED THE BUILDING OF AIRSHIPS; AND (*h*)—GENERAL TRENCHARD HAD NO SUFFICIENT TRAINING IN FLYING.

138. Both these charges are quite unfounded.

(*h*)—GENERAL HENDERSON DECLINED TO ALLOW LEWIS GUNS TO BE SENT TO THE FRENCH IN EXCHANGE FOR ENGINES.

139. Upon this charge we quote General Henderson's answer, which we accept. General Henderson said—

"I was accused of having stopped that, or interfered with it. Major-General Sir Stanley Von Donop, M.G.O., deals with that in the following minute:—'Continual strong recommendations have been received from the General Officer Commanding Royal Flying Corps, that Lewis guns should be supplied to him for issue to the French. On these recommendations the number allocated to Royal Flying Corps was varied at various times in order to meet the demand. In addition to the guns thus received by the French Aviation Department from the Royal Flying Corps special issues have been made at times by the War Office.'"

General Henderson added:—

"It is one of the things that I have taken more trouble about than anything else, and I have even cut down Lewis guns for our own aeroplanes in order to supply them to the French, because I looked upon it that it did not matter who brought down the Germans, whether it was our aeroplanes or Frenchmen's."

(*l*).—GENERAL HENDERSON . . . . . .

140. Here again we . . . accept General Henderson's Answer, . . .

(*m*) EXCESSIVE FLYING TO CREATE A RECORD.

141. A record is kept by every squadron at the front showing the number of hours flown per diem by every aeroplane. A record is required in order to be able to trace the nature and length of the duty on which every aeroplane has been employed. The record enables the life of a machine and engine to be ascertained. It provides material for tracing failures in any particular type and for comparisons with other types to be drawn with a view to future commitments.

142. We are not blind to the fact that this record must indicate to headquarters how the different squadrons compare in performing their duties, whether, for instance, they are active enough whilst not being too active to the detriment of the pilots and machines.

143. It is suggested that this leads the superior officers to send more machines to do a piece of work than are necessary, or to send them up on pretended errands. It may be so, although we have no evidence of it. There are always to be found persons who hope to rise by making an impression of zeal and keenness. There are also some persons in authority who are so impressed. We have no evidence that the General Officer Commanding the Royal Flying Corps in France is among their number. Even if he is, the record is so obviously valuable, and indeed necessary, that the risk of it being abused must be run. We should suppose that any instance of real abuse is fairly easy to detect.

(*n*) NO MACHINES WENT UP ON THE OCCASION OF THE RAID AT DOVER BY A GERMAN SEAPLANE WHICH WAS OVER DOVER ON OR ABOUT JANUARY 31ST, 1916.

144. It appears that Dover is a Naval War Station, and that the Royal Flying Corps merely has a training and mobilising ground there. On the date in question it happened that General Henderson was inspecting there. He had just gone into the mess-room when he heard the anti-aircraft guns firing. The only portion of the Royal Flying Corps at Dover at the time was a half-completed squadron ready to go abroad. Directly the guns were heard the pilot on duty ascended in pursuit of the German seaplane, and was immediately followed by two Naval machines, and these again by another Army machine. It appears that the machines went up in the opposite direction to Dover, so were not seen by the inhabitants of that town. The day was rather misty and the German seaplane 8,000 ft. up, so that the British machines were unable to catch it. Another allegation was that the anti-aircraft guns fired at the British aeroplanes, and there is evidence which points to some rounds having been fired at one of the Naval machines.

(*o*) THE SENDING HOME OF 74 PILOTS FOR FURTHER TRAINING THE DAY AFTER MR. PEMBERTON BILLING'S ELECTION TO THE HOUSE OF COMMONS.

145. This charge was not made by Mr. Pemberton Billing. There is no foundation for it, and certainly none for the implication that the return of Mr. Pemberton Billing was the cause. The suggestion probably originated in the fact that observers who wish to become pilots are from time to time

sent home in batches, as also are pilots when promoted or when sent home to form new squadrons.

146. The charge was made in perfectly good faith, and affords an excellent illustration of how a witness who retails information of the "gossip" order may be misled, and, incidentally, of the class of unfounded sinister suggestions which we found to be abroad.

147. Of the accidents and misadventures under letter (*p*), we only deal in the report with the first three. The remainder, while regrettable, as are all losses of British airmen, are instances of the kind of mishap at present inseparable from flying, and raise no question of principle.

(*p*) 1. THE MISHAP TO MACHINES ON JANUARY 31ST LAST.

148. This case was presented to the Committee in the following words :—

"I think, if the Committee will inquire into the actual condition of the actual occurrence on the night of January 31st, they will discover that 14 or 15 machines were sent up, that approximately 75 per cent. of the pilots were killed and that no useful purpose, as far as I can see from the Military standpoint, was either accomplished or attempted."

149. The facts of the case as brought out in evidence are, that on that particular night, a Zeppelin raid was reported as threatening London, and orders were issued to nine stations as follows :—"*If weather conditions permit* you will send up the first patrol at 7.35 p.m. The second patrol will go up at 9 p.m."

150. In view of the often repeated allegation that peremptory orders are issued from the Royal Flying Corps Headquarters to send pilots up without regard to the local weather conditions, we call attention to the form of this order, which is typical.

151. There was in most places a ground mist, and had no attempt to ascend been made no fault could have been found ; but the zealous and brave airmen, taking great risks, ascended into the air and, owing to the thickness of the weather, met with many accidents on attempting to land, the total casualties being that four pilots were injured, two only comparatively slightly, whilst two eventually succumbed to their injuries. Of the machines, seven were damaged and four hopelessly smashed.

152. Serious as the results were, they fall far short of the allegation that 75 per cent. of the pilots were killed. In its Interim Report, the Committee has already drawn attention to the self-sacrificing devotion and bravery of the pilots ; and, as it appears that all the pilots were experienced in night-flying, it only remains for us in this Report to record our opinion that no blame can attach to the Directorate of the Royal Flying Corps.

(*p*) 2. THE DE HAVILLAND SQUADRON CASE.

153. This case occurred on March 25th, 1916. It concerns a squadron of new scout machines—single seated and fast—which was urgently required at the front. The machines had only just been completed, except three which had been stationed at Gosport (where the 29th Squadron, the one in question, was being trained) for a month or six weeks for training purposes. Altogether 12 machines were required in France, two of which were to go from Hendon and 10 from Gosport. The machines were being delivered at Gosport during the days immediately preceding the 25th, the last arriving on March 24th.

154. It is said that the pilots were refused leave to try their machines, but there is evidence to show that all pilots had some practice in them, though some of them had too little.

155. The 10 from Gosport got into a snowstorm, and six had to make forced landings between Gosport and Dover. Fresh machines were procured and more accidents occurred, with the result that, in order to deliver 12 serviceable machines in France, 26 or 27 were consumed, of which four were completely smashed and the remainder eventually repaired. Mercifully only two pilots were hurt, and they only slightly. Apparently two of the 10 pilots from Gosport were considered very experienced. The two from Hendon reached France in safety, but did not encounter the snowstorm, but whether those two pilots had been overseas before is not quite clear. An attack of measles had prevented the presence of the mechanics at Gosport for some days previously, and this may partly account for the disastrous results ; but Brigadier-General W. G. H. Salmond, R.A., who reported on the affair, considered the snowstorm was the main cause of trouble. It is noticeable that even the two experienced Gosport pilots also came to grief.

156. It appears that of the 10 machines which were dispatched from Gosport—six of which made forced landings between Gosport and Dover—six had no compasses ; but whether the six which were forced to land were all those without compasses there is no clear evidence. We were informed that, as the demand for the Squadron was urgent, the despatching officer felt himself justified in sending off these six machines, arranging for them to pick up their compasses at Folkestone, which they eventually did.

157. It has been urged before the Committee that none of the accidents resulted from the absence of compasses. This view, however, the Committee is not prepared to accept, as, without evidence to the contrary, it is quite possible that the absence of compasses materially contributed to bringing some of the machines to grief.

158. It appears also to the Committee that the pilots had not sufficient experience to compete with such a snowstorm in machines which were more or less new to them ; and that, in ordering the squadron to proceed to France without giving more time for getting thoroughly efficient in flying a new and by no means easy machine, considerable risk was taken by the Royal Flying Corps Directorate. But whether the state of affairs in France at the time was such as to necessitate so great a risk being taken by the Directorate—and, in the case of the compassless machines, by the Dispatching Officer at Gosport—is beyond the knowledge of this Committee.

159. The point which impresses us most in this De Havilland Squadron Case is the absence of a formal enquiry. We are strongly of opinion that, upon the happening of a disaster of this magnitude, involving great loss of Government property and of (*ex hypothesi*) urgently needed machines, a court of inquiry should have been at once assembled, and a most searching investigation made. It is true there was no actual loss of life, but that does not alter or modify our opinion. The incident was, we think, treated far too lightly.

(*p*) 3. THE LANDING OF AN F.E. 2D MACHINE WITH A ROLLS-ROYCE ENGINE AT LILLE.

160. This incident happened on May 31st last. It was desired to send to France an F.E. 2D machine fitted with a 250 h.p. Rolls-Royce engine, a new combination of which the highest expectations were entertained. The machine was at Farnborough. There are stationed at Farnborough ferry pilots whose duty it is to fly machines to St. Omer in France and to return. It was intended to send one of these pilots across with this machine. The particular pilot selected was required for some other duty on the day in question, but other ferry pilots were available. As a fact, no ferry pilot was sent, but instead, Lieutenant Littlewood, who was considered very efficient, but had never flown to France before, flew this machine across. How he came to be chosen for the duty is not clear.

161. The officer responsible for detailing the pilot for the purpose tells us that he received a telephone message from the War Office to say Lieutenant Littlewood was coming down to take the machine over. This officer informed us that he told the person speaking to him on the telephone that Lieutenant Littlewood had done no flying on an F.E. 2D machine, but had done a little on an F.E. 2B. The reply was that he had been well reported on and was considered capable. Lieutenant Littlewood was intended to remain in France. The witness was pressed for the name of the person who spoke to him on the telephone, but he had forgotten it. This was a somewhat singular lapse of memory seeing that, although he did not give evidence before us until August 1st, the incident was well known the day after it happened, and, one would have thought, it would have made a considerable impression on the minds of the persons concerned in sending Lieutenant Littlewood over. It is to be presumed that the somewhat mysterious gentleman who was at the War Office end of the telephone knows who he was and why he gave the order. It is unlikely that both gentlemen should suffer from so singular a lapse of memory about an incident of such importance. It is the more unlikely as the Rolls-Royce engine was only the second of its kind sent over. The speaker from the War Office was not called, nor did he volunteer to come forward. He has preferred to remain a voice.

162. Lieutenant Littlewood went, and took with him a staff officer who had never, so far as we know, been in a machine before. This gentleman was said to have an important engagement in France. He was over here on leave, and if he had gone by train and boat he would have needed to start a day earlier. On the other hand, he would have kept his appointment.

163. Lieutenant Littlewood mistook Lille for St. Omer and landed at Lille. In the course of his descent he was fired at, and the machine was brought down by anti-aircraft guns and badly smashed. This latter point is important, as we have undeniable evidence on the subject and it refutes an allegation explicitly made before us that the machine was handed over intact to the enemy. Lieutenant Littlewood and the staff officer are prisoners.

164. The incident in itself is not at all worth relating at such length, but it discloses a system, or rather want of system, which we much deprecate. We were told these telephonic messages are quite common and that no record is kept of them.

165. We are of opinion that whenever the duty of detailing a pilot to fly a machine abroad is taken out of the hands of the officer primarily responsible, or indeed when any important order is given by telephone, a record should be entered in a book kept for the purpose giving full particulars of the order received and certainly the name of the person giving the order. Without such a record it is impossible to fix responsibility.

166. Lieutenant Littlewood may have been a suitable pilot, but the staff officer ought not to have been sent with him. Some criticism was made upon the map supplied, but we find no fault in that respect.

167. . . . . .

168. We have stated our conclusions upon the charges submitted to us when dealing with each particular charge, and need not repeat them.

169. We are asked to make such recommendations* as we consider necessary. This we now proceed to do.

(* *These recommendations were published in* "FLIGHT," *December 21st.*)

174. We desire to put on record our appreciation of the services of our secretary, Mr. D. Cotes-Preedy—services rendered gratuitously and at the expense of some loss to him in his practice, which he put aside when his duties as secretary prevented his fulfilling his other engagements.

We are, Sir, your obedient servants,

CLEMENT M. BAILHACHE (*Chairman*), H. L. SMITH-DORRIEN (*General*), CHARLES A. PARSONS, J. H. BALFOUR BROWNE. †J. G BUTCHER, EDWARD SHORTT, †CHARLES BRIGHT.

D. COTES-PREEDY, *Secretary*.

MEMORANDUM FROM MR. CHARLES BRIGHT AND MR. J. G. BUTCHER.

We desire to express our dissent from that portion of the Final Report which states (paragraph 44) :—"We think the reason why the R.A.F.-Napier engine was selected for the gamble was because it was—at any rate, partly—of R.A.F. design, and that this is an instance in which great reliance has been placed in the R.A.F." This view is not, in our opinion, established by the evidence. Difficulties had occurred in the production of the Rolls-Royce engine as mentioned in paragraphs 123 of the Report, though more fully set out in the evidence of the 15th day of our enquiry. This evidence makes it clear that not one of the three firms approached by the Directorate could come to a mutually satisfactory arrangement with the Rolls-Royce Company for the construction of their engine. It was for this reason that General Henderson did not give large orders for the Rolls-Royce engine at the time when he gave large orders for the R.A.F.-Napier engine. In the circumstances, we think that, in giving these orders for the R.A.F.-Napier engine, General Henderson acted rightly.

CHARLES BRIGHT.
J. G. BUTCHER.

FURTHER MEMORANDUM FROM MR. BRIGHT AND MR. BUTCHER.

Since the issue of our Interim Report attention has been called to the finding of the Royal Aero Club's Public Safety and Accidents Investigation Committee regarding the fatal accident to Lieutenant Desmond Arthur. It is to be regretted that the said Committee's Report—and the evidence on which it was founded—was not brought to our notice by any witnesses dealing with the subject during the course of the enquiry. Whilst we have not had the opportunity of testing the evidence on which the Committee's finding was based, it now appears to us to be more than likely that at least one highly defective repair had, in actual fact, been made at some time or another to the machine. There is, however, no evidence to show where or by whom. In any case, it seems to have been effected by some unauthorised person—certainly by an unskilled hand. It appears probable that the machine had been damaged accidentally, and that the man (or men) responsible for the damage had repaired it as best he (or they) could, to evade detection and punishment. In making this statement we are taking the first suitable opportunity of amending—so far as we personally are concerned, and to the extent indicated—what appears on pages 7–8 of the Interim Report regarding the last case dealt with.

We desire further to express our complete sympathy with the resultant recommendations of the said Committee as expressed in the following terms :—

"The accident points to the necessity for expert superintendence of every repair, however slight, of the structure, and independent inspection of such repair when completed, full details being recorded in the history sheet of the aircraft. After any important repair to the structure has been made, it should be so marked that both the workman by whom it was done and the examiner who subsequently passed it fit for service can be identified."

This accident occurred, it will be seen, in comparatively early days—well before the war—and the above recommendation has, we understand, since been in effect generally enforced.

CHARLES BRIGHT.
J. G. BUTCHER.

† Subject to the Memoranda appended.

ADDITIONAL RECOMMENDATIONS OF MR. BRIGHT.

Whilst some of the following recommendations may be considered rather outside the scope of our immediate terms of reference, it has seemed to me that a useful purpose might be served by presenting the conclusions arrived at after (1) a six months' complete concentration on the whole subject, (2) a previous study, covering several years, regarding special aspects, and (3) some little experience in the air.

Aerial warfare generally is now attracting a great deal of public interest—besides becoming every day of increasingly wide importance—and I here call attention to what, as the result of close investigation, strikes we more especially as points requiring consideration.

I should add that some of my recommendations, as set forth below, are only presented as objects to be aimed at as far a possible if and when circumstances permit ; others have reference to what may already be to some extent the practice nominally—though not, perhaps, fully carried out at the present time.

(i) CIVILIAN TRAINING SCHOOLS.

Whilst I am satisfied that the attention to Civilian Training Schools has been considerable, it appears to me that in days to come all possible encouragement should be accorded to civilian pilots on a really lasting basis, and that an extended study might suitably be made of the future development of civilian schools for war equipment purposes.

(ii) ADVICE FROM ACTIVE SERVICE PILOTS.

I am of opinion that Squadron Commanders and active service Pilots of considerable experience at the front might be more taken into consultation, in an official way, regarding machines and engines.

An additional advantage would be gained here in the event of a second misfortune with a given machine—whether with the same pilot or otherwise—in view of the fact that there is always a chance of the blame being thrown on the engine or machine, where it should not be.

It might be arranged that on the occasion of an officer returning from the front, he should hand in any suggestions arising from his experiences to the Aircraft Committee proposed in Recommendation xv.

(iii) INVENTIONS.

Every possible encouragement should, I think, be given to any new practical inventions in the field of military aviation ; and, in the case of one that seems really likely to prove of material value if developed, suitable financial aid should, where desirable, be granted for that purpose by the Government.

If a public research laboratory were established—either by the State or by private enterprise—a considerable impetus to invention should accrue, especially if official aid were available. M. Eiffel's Laboratory in Paris, which answers to this description, has proved its public utility.

(iv) INSPECTORS.

I am strongly of opinion that in view of the extreme importance of highly efficient inspection of war aircraft and aero engines, steps should be taken—at any rate as soon as the war pressure passes off—to introduce into the Aeronautical Inspection Department (A.I.D.) more who have had a training that would especially fit them for the work in a technical sense, including a substantial knowledge of the materials involved. With this object in view I would, indeed, urge that application might be suitably made to such recognised organisations as the Institution of Civil Engineers and the Institution of Mechanical Engineers, who would no doubt be able to recommend suitable engineers. This want of trained men, in my opinion, applies—

(*a*) To the department considering proposed designs ;
(*b*) To that inspecting the designs when carried out ;
(*c*) To service at the front for reporting on the performance of new machines in active service.

No doubt the present arrangement quite suitably applies to many of the supernumeraries, but not, I think, to those carrying out the more responsible work.

The salary offered to inspectors and viewers does not strike me as being likely to attract the sort of man that—from a technical and moral standpoint—is really required; and I am not altogether surprised to find, in the circumstances, that a certain degree of laxity has prevailed at one time or another in this department, more especially in regard to the working hours and working arrangements generally. I consider that the wages at present paid to these officials bear an unsuitable relation to those making the machines and engines.

(v) DATING INSPECTION STAMPS.

Arising out of certain evidence, I recommend that all inspection stampings should, in future, be dated. This plan would greatly help towards placing responsibility in the case of any mishap due to faulty construction, faulty repair, or faulty inspection at any of its various stages.

(vi) STANDARDISATION.

Having regard to the rapid aerial developments as an outcom of war experience, I do not consider that anything in the nature of close standardisation—brought to so high a pitch in almost every direction in the United States—could be suitably applied to aviation in its present stage, though it is highly likely that more might be done in standardising certain parts such as are common to all machines.

On the other hand—in view of the conflicting requirements of machines for different work—I would strongly urge the desirability of more definitely designing machines for specific purposes. For example, in my opinion, a long-range reconnaissance machine should be designed almost solely from that standpoint and without regard to any conflicting requirements. Again, a long-range "bomber"—a more recently-considered requirement—should be made a separate and special study of.

In the early days of the war, when aeroplanes were solely regarded as reconnaissance machines, it was but natural and proper, as soon as their fighting properties began to be considered, that—partly in view of the shortage of men and material—the same machine should be turned to several different accounts and produced on that basis. It stands to reason, however, that a combination machine of this description can never be as efficient in any one direction as a machine especially designed to do specific work.

Whilst, in my opinion, the time is not ripe for any material standardisation of the types of machines, engines, &c., I feel strongly that some sort of standardisation is highly desirable in connection with much of the data put forward regarding the material used. For instance, there should be some definite standard time in air on which to base the weight per horse-power. At present the amount of petrol allowed is sometimes based on a 1 hour's flight, and sometimes on 6 hours', &c.

I also consider that other standards should be adopted in the case of trials.

Again, in a number of instances the statistics at present provided about different machines and engines strike me as quite inadequately comparable.

It appears, indeed, at present—for want of standardisation—to be impossible to secure really comparable data (under the same conditions and with conditions exactly stated) for the trials of different machines and engines.

Similarly, a definite understanding ought, in my opinion, to be come to—between the Aeronautical Directorate and all those designing and supplying engines—regarding the statement of horse-power, in such a way that the horse-power of all engines is either correctly stated or uniformly under-stated.

(vii) STANDARD HEIGHTS FOR SPEED AND CLIMB AND STANDARD TIME FOR CLIMB.

I would strongly urge that, for purposes of proper comparison, standard heights should be adopted both for speed and climb as well as a standard (unit) time for climb.

At present there appears to be no common rule in the matter, some private firms expressing the performances of their machines and engines in one term and others in another.

I suggest that the speed specified should be (*a*) that practically at ground level—as is customary; and also at (*b*) the fairly average working height of 10,000 ft. (or 5,000 ft.) where it may be something between 5 and 10 m.p.h. less.

Similarly, in the matter of climb this should be expressed (*a*) in miles per hour at a height of 10,000 ft.; or, if the machine is not capable of reaching that height, then the rate of climb in m.p.h. should be stated for whatever the maximum height is. Further (*b*), a statement should be given as to the length of time taken to reach the 10,000 ft., or whatever is the maximum height attained.

(viii) NOMENCLATURE.

I cannot help thinking that steps might suitably be taken to adopt a system of nomenclature that would indicate the engine and horse-power that is combined with the machine itself; so that when, say, the B.E. 2c is referred to it is not necessary to investigate with what engine she is fitted in that particular instance.

Certainly, so far as concerns R.A.F. designs, the present more or less haphazard and confusing system of nomenclature ought to be capable of improvement in the way of a consistent plan.

Again, some general agreement should, in my opinion, be arrived at as to the description of different machines relative to their purpose. The most striking example of the need for attention here is the so-called "Scout." That term is only at all generally applied now to a "single-seater," comparatively small, agile machine; yet no single-seater is suitable for "scouting" if that term is taken to mean reconnaissance such as involves the services of two officers. On the contrary, machines that are going by the name "Scout" are mainly "fighters"—offensive and defensive—and machines used as guards.

I urge this point—as well as those immediately preceding—whilst the development of military aviation is still in its comparative infancy; for, in my opinion, anything like haphazard nomenclature or standardisation should not proceed further lest it some day lead to serious misapprehension of one kind or another.

(ix.) ESSENTIAL EXTENSIVE DEVELOPMENT OF AIR SERVICE.

I submit that the future development of military aviation on an extensive scale is eminently desirable. Material increase in the number of our aircraft, flying schools and aerodromes will naturally help towards such development.

There exists still, without doubt, a shortage of high-class machines and engines for meeting what lies before us. A far greater number of aircraft, adequately engined, is essential.

This conclusion is forced on anyone who at all closely reviews the present outlook on account of:—

(*a*) The important part the air is undoubtedly going to take in warfare—partly owing to the comparative cheapness of aerial strategy as compared with sea strategy—even the biggest and most expensive airship not costing one-tenth what has to be paid for a "Dreadnought." Thus, it is even conceivable that our main line of defence may before long, be in the air.

(*b*) The necessity for a far-reaching and really secure permanent defence of these islands against air raids.

(*c*) The now abundantly proved value of aeroplanes for successfully attacking Zeppelins.

But the need for increasing our air strength in mechanics, instructors, pilots and Home Defence Stations is still more markedly insistent. It is the lack of mechanics, &c. (due largely to munition demands) more than anything that retards the supply of engines and in a lesser degree of aeroplanes. Similarly, the comparative scarcity of first class flying instructors keeps back the output of efficient pilots. The supply of high-class observers must also be considerably extended. Moreover, the observer being really a more important person than the pilot—on a reconnaissance machine at any rate—his status needs to be improved upon in the future.

(x) INCREASED OUTPUT AND ADDITIONAL FACTORIES.

In order to provide the enormous increase required in our supply of aircraft and aero engines, considerable development of the factories concerned therein must follow as soon as the necessary labour is available. To meet this, I would urge the payment of suitable Government subsidies. Attaching considerable importance to a large and continuous output of aircraft without interference from the enemy, I would further urge that in most instances this additional source of supply should be secured, for strategic reasons, by means of supplemental factories in a part of the country as far west or south-west as possible.*

For the same reason these works should, I think, be built underground as far as practicable, and all possible precautions taken towards secrecy such as, more or less, obtains in a factory under Government control.

(xi) NIGHT LANDING GROUNDS.

Steps should at once be taken, so far as may be, to establish more large and thoroughly satisfactory night landing grounds, capable of being adequately lighted and darkened at a moment's notice, and such as will get over the necessity for the return of machines to their base before dark. Failing

* The further an airship (or an aeroplane) has to travel from her base the more fuel required, and, therefore, the less weight in bombs she can carry. Thus there is no useful purpose in raids beyond a certain range depending on the speed of this class of aircraft.

anything more convenient, possibly some of the large race-courses still available might be commandeered for the purpose.

(xii) LIGHTS FOR NIGHT LANDING GROUNDS.

Whilst, undoubtedly, the light obtained from the ordinary petrol flare is better suited to the purpose than the white light from the usual electric arc lamps,* the same does not apply in the case of the comparatively new flame arc lamps, which I recommend for this purpose. These give a yellow red arc when the carbons are made in a manner separately communicated. Indeed, the light produced by the yellow flame carbon has the highest penetrating power of any known illuminant and is at great advantage over all others (including petrol flares) in foggy or hazy weather. The light obtained from these special flame arc lamps (fitted with yellow flame carbons) is very near in colour to petrol flares, but is considerably more powerful.

A further and important advantage in an electric lighting system of the special type named would be that, unlike petrol flares, all the lights can be simultaneously switched on and off at a moment's notice.

(xiii) COAST PATROLS.

Following the example of Paris, an extensive system of air patrols round our coasts would be highly useful by way of defence against enemy aircraft—if and when the supply of aeroplanes and pilots is sufficiently increased.

(xiv) OFFENSIVE RAIDS.

The Military Air Service should be so developed and brought up to such a strength that an organised system of attack and continuous bombardment is made on every point of strategic importance, including depôts of every kind in the rear of the enemy's lines, railway junctions, rolling-stock, bridges, &c.

Such a recommendation carries with it the necessity for a concentrated development of the long distance raiding (bomber) aeroplane, capable of considerable endurance in the air, and having a wide speed range—*i.e.*, a low speed (as well as high) for safe landing purposes—to meet the case of return by night.

(xv) AIRCRAFT COMMITTEE.—(For design of aircraft, engines and stores connected with aerial warfare.)

While I consider that the organisation of the Royal Flying Corps and the Military Aeronautics Directorate is of high order, it seems to me, with a view to meeting the future enormous development of aerial warfare, that certain changes in the form of administration will before long become desirable, if not actually essential—more especially in regard to the technical and material side of things.

In the scheme indicated below an endeavour has been made towards the representation of all interests involved without any single official finding himself in a dual capacity.

Whilst as a start, the necessary work has probably been conducted in the best way—or at any rate the only way that was available—the desirability for an executive staff of highly trained specialists will more and more force itself home as time goes on and as officers answering to that description come to hand.

It is hoped that such a plan will help towards the greatest possible expedition in the production of aircraft, engines, &c. Whilst full responsibility will thereby rest with the executive side of the committee, members of the consultative side will always be available when called upon for opinions at any of the meetings which would require to be more or less constant during a state of war.

The suggested abandonment of the Advisory Committee for Aeronautics would only mean that the individual services of its members would be turned to more useful account in the course of direct meetings with the executive side of the committee. It is thought, for instance, that the services of the highest authorities on various branches of the subject—such as internal combustion engines—would be of still greater value if the individual authority concerned were consulted in the manner suggested than would be likely at deliberations of the Advisory Committee as a whole.

AIRCRAFT COMMITTEE.

Chairman.

An officer of high rank with considerable administrative and business capacity—possibly (but not necessarily) from the Royal Engineers or Royal Artillery.

Executive.

1. Two or more military officers for considering and reporting on designs of—
   (*a*) Aircraft and details,
   (*b*) Engines,
   (*c*) Armament, &c.,
with high technical qualifications (probably 2 at least in each case).

2. Two experienced Aircraft *Users* in *each* case (*i.e.*, aeroplanes, airships, engines, armour, guns, bombs, &c.)

Consultative.†

(Without voting power.)

Each member of the existing Advisory Committee for Aeronautics.‡

Director of National Physical Laboratory.

Director of Aircraft Equipment.

Consulting Engineer to Military Aeronautics Directorate.

Superintendent of Royal Aircraft Factory.

Chief Inspector.

One additional outside civilian expert in each case, *i.e.*, aircraft, engines, armament, guns, bombs, &c., as well as, perhaps, a civil engineer of definite business experience and attainments.

Secretary (from the Army or Civil Service).

Assistant Secretary (from the Civil Service or Army).

TERMS OF REFERENCE.

1. The consideration of all designs in connection with aircraft and the drawing up of reports and recommendations thereon for the Director-General of Military Aeronautics.

2. The consideration of all inventions connected with aeronautics.

3. The carrying out of all experiments with aircraft and reporting thereon.

Notes.

1. It is suggested that on the Executive side of this Committee there should be at least two officers under the heads *a*, *b* and *c*, as set forth. These positions would, it is considered, be most suitably filled by officers who have originally had a mechanical engineer's training.

Under Clause 2 amongst others, pilots (and even experienced observers, *per se*) are proposed. The former should be picked squadron commanders who have had material and up-to-date experience at the front.

2. The consultative side of the Committee is somewhat on the lines of the "Associate Members" of the Ordnance Committee in regard to guns, &c., at Woolwich—which plan, it is believed, works satisfactorily. By the introduction of additional (and independent) civilian experts a certain amount of extra public confidence is likely to be secured. It is hoped that there would be no lack of consultation with civilians by military officers whenever an occasion arises.

I desire here to take this opportunity of testifying to the valuable scientific research and experimental work of (*a*) The Advisory Committee for Aeronautics, (*b*) The Aeronautical Research Department of the National Physical Laboratory, and (*c*) The R.A.F., the first based on mathematical calculations, &c., the second on wind channel experiments,§ and the third on full scale experimental work—together with the study of many practical problems outside the range of purely scientific work.‖

3. With the important exception of further introducing on the Executive side officers with a special mechanical training, this scheme would not materially affect the actual constitution of the existing personnel, but is more with the object of re-arranging the same on such a basis that no one is put into anything in the nature of a double position.

4. It is thought that neither those (*a*) responsible for the Inspection of Aircraft, &c., (*b*) for Contracts connected therewith, nor (*c*) those controlling the R.A.F., should have executive responsibility in the general design and selection of aircraft. They are always available in a consultative capacity.

(xvi)—COMBINATION BETWEEN AIR SERVICES.

I venture to think that considerable advantage would be gained if the two branches of the air service worked harmoniously together for their mutual benefit. For instance, material benefit would be likely to arise from periodic meetings between those in charge of each corresponding department for the purpose of interchanging views on new experi-

* That was settled so far back as 1885, when the South Foreland experiments were conducted at the instance of Trinity House (*see* "Report of the Committee on Experiments at South Foreland relative to Electricity, Gas and Oil as Lighthouse Illuminants.") (C.—4551.)

† To be called in as "witnesses" for consultation on specific points at any meeting they may be required for.

‡ Hence under this scheme the Advisory Committee for Aeronautics might, as a separate organisation, be suitably abolished.

§ These experiments with model aeroplanes of given design have proved of considerable value in determining the best pattern for wings, &c., to meet different requirements.

‖ Much is due to the R.A.F. for the practical development of (*a*) inherently stable aeroplanes, and (*b*) wires designed for reducing head resistance.

ences, developments, &c.; and I am convinced that all research work—including full scale experiments in life-size machines—should be conducted on a mutual basis, the results arrived at being at the equal disposal of both branches.

By this means, too, unnecessary overlapping could be avoided, and administrative economy secured.

I am strongly in favour of the Air Board establishing a joint committee of supply for providing both the Navy and the Army with aircraft and its appurtenances, and should like to see this cover (*a*) a Joint Contract Branch; (*b*) a Joint Inspection Branch; (*c*) a Joint Equipment Branch; and (*d*) a Joint Inventions Branch.

The effect would be not only to bring the two air services more together, and reduce friction by competition, but also to substantially cut down expenses due to overlapping.

Further, it is to my mind clear that considerable benefit would accrue from the naval and military air services being co-ordinated under the control of a single organisation in the person of the Air Board.

NOTE.—Recommendation XV. is subject to Recommendation XVI., that is to say, if the two air services are—as would be preferable—co-ordinated, at any rate in the matter of design and supply, the suggested aircraft committee would require to be modified in its personnel by the executive side being equally composed of naval and military officers.

CHARLES BRIGHT.

Personals.

UNDER the above heading will be published weekly particulars of a personal character relating to those who have fallen or have been wounded in the country's service, announcements of marriage and other items concerning members of the Flying Services and others well known in the world of aviation. We shall be pleased to receive for publication properly authenticated particulars suitable for this column.

Casualties.

Lieutenant CLAUD A. FELIX BROWN, R.F.C., killed on December 26th, aged 21 years, was the elder son of Mr. and Mrs. Ernest Brown, of Leecroft, Leeside Crescent, Golders Green, and formerly of Merok, Woodside Park. Educated at Highgate School, he enlisted at the outbreak of the war in the London Rifle Brigade, and proceeded with the first battalion to France. He was invalided, suffering from shell shock, at Christmas, 1914, returning again to the Front in February, 1915. He received his commission in the spring in the West Yorkshire Regiment, and shortly afterwards served at Gallipoli, being attached to the Lancashire Fusiliers. He was admitted to hospital in Alexandria at Christmas, 1915, and in the following spring was transferred to the Royal Flying Corps, and was later promoted to the rank of Lieutenant.

Lieutenant ERIC CLARK, R.F.C., killed at the Front, was the elder son of the Mayor of Maidstone, Councillor G. Foster Clark. He was 20 years of age; he had previously served on the Western Front with the Buffs. Lieutenant Clark was educated at Mill Hill School.

Second Lieutenant CHARLTON WILLOUGHBY HOUGHAM FOORD, Machine Gun Corps, who died of wounds on December 19th, aged 31, was the only son of Mr. Alfred Stanley Foord, of Laurel Road, Wimbledon. He was educated at Dulwich College, and after having served an apprenticeship with Messrs. Gwynne, engineers, Hammersmith, he entered the firm of Messrs. Marks and Clerk, consulting engineers and patent agents, being in charge of their branch office in Southampton Buildings from March, 1911. He was elected a Fellow of the Royal Society of Arts in 1911, and of the Chartered Institute of Patent Agents in 1913. He enlisted in June, 1915, in the R.N. Anti-Aircraft Corps for foreign service, but finding that Corps was no longer sending men abroad, he obtained, in January, 1916, a commission in the Army, being gazetted to the Buffs. He was sent to Ireland for training, and was employed in the suppression of the Sinn Fein rebellion. In June, 1916, he was transferred to The Queen's, and was to have gone to the Front in September, but was transferred to the Machine Gun Corps, with which he went out to the Front last November.

Second Lieutenant BERNARD VERNON GORDON, R.F.C., who was killed whilst flying on December 14th, was 18 years of age and had received his commission direct from Eastbourne College. He was the youngest son of the late Thomas Gordon and of Mrs. T. Gordon, of Eastbourne and Sevenoaks. His brother, Second Lieutenant Donald Jervis Gordon, was killed near Thiepval on July 3rd, 1916.

Lieutenant H. G. MURRAY, Canadian Trench Mortar Battery, attached R.F.C., who was killed on December 16th, was the second son of Mr. A. G. Murray, LL.B., barrister, of Fort Frances, Ontario. He was a B.A. and lecturer in physics of Toronto University. Last November he transferred to the Royal Flying Corps.

Captain and Flight-Commander J. W. W. NASON, Royal Sussex Regiment and R.F.C., killed in action, was the son of the late C. St. S. R. Nason, M.A., M.D., of Corse Grange, Gloucester, and of Mrs. Nason, 23, Grosvenor Crescent, St. Leonards-on-Sea, and was born on August 4th, 1889. He joined the Army on the outbreak of war, and received his Captaincy in November, 1914, transferring to the Royal Flying Corps in January of last year. Captain Nason first played for the Sussex County XI at the age of 17, and received his Blue at Cambridge on his third appearance for the University—earlier than it had ever been awarded before—appearing against Oxford in 1909 and 1910. He also played for the University at Association football. Captain Nason was invited to play for the Gloucester County XI, and did so for two seasons. He was also a fine golfer, having a handicap of plus 2 at Cooden Beach.

Lieutenant CECIL W. H. PARKER, Worcestershire Regiment, attached R.F.C., killed, was the elder son of the Rev. W. H. Parker, Vicar of St. Peter's, Birmingham. Born in 1894, he was educated at Edgbaston Preparatory School and King Edward's High School, Birmingham (1905–14), where he obtained a scholarship. He won a cadetship at Sandhurst in 1912, but was refused on account of insufficient chest measurement. On leaving from the first class he was, in May, 1914, commissioned Second Lieutenant in the Special Reserve to the Worcestershire Regiment. He went to France in October, 1914, was in the first battle of Ypres, where the Worcestershires were specially mentioned by the Commander-in-Chief; was selected for service in the Cameroons, February, 1915; and was on the "Falaba" when she was torpedoed. After nine months' home service he returned to the Front in March, 1916, took part in numerous engagements, in which he was for some time Acting Captain, and was recommended for distinguished bravery in action by the Brigadier-General.

Second Lieutenant GODFREY JAMES WILDING, Royal Lancaster Regiment, the eldest son of Mr. and Mrs. James Armstrong Wilding, of Lebot Wood, Woodside Park, London, was born in 1898 and educated at the City of London School. He joined the Royal Naval Air Service as Petty Officer in April, 1915, and saw service in Belgium with the armoured cars. He obtained his commission as a Second Lieutenant in the Royal Lancaster Regiment in October, 1915, and was killed on December 20th last.

Married and to be Married.

The marriage of Lieutenant HOWARD CUMMING, R.F.C., with EILEEN NORAH, daughter of the late JAMES GRIMBLE GROVES, J.P., D.L. (Cheshire), and of Mrs. GROVES, 30, Chester Terrace, Regent's Park, N.W., takes place at 11 a.m. to-day (Thursday), at the Parish Church of St. Marylebone.

Lieutenant ALAN DUGUID, R.F.C., eldest son of Mr. and Mrs. Charles Duguid, of Park Lodge, New Barnet, Herts, was on December 30th married at St. Matthias', Earl's Court Square, to ADA MYFANWY, only daughter of the late Mr. JOHN THOMAS (Pencerdd Gwalia) and Mrs. THOMAS, Inglenook, Blandford Road, Bedford Park, W.

The engagement is announced of Lieutenant PETER P. ECKERSLEY, R.F.C., youngest son of the late W. A. Eckersley and Mrs. Shawcross, 15, Belsize Park, and Half Year House, West Runton, grandson of the late Professor Huxley, to STELLA, younger daughter of Mr. and Mrs. J. C. GROVE, Watercroft, Penn, and 92, Sloane Street, and granddaughter of the late Sir George Grove, C.B.

An engagement has been arranged between Lieutenant DAVID D. FOWLER, R.F.C., eldest son of the late James Fowler, of Dyxcroft, Rottingdean, Sussex, and JOAN AUDREY WATERHOUSE, youngest daughter of Agnes Waterhouse.

The British Air Service

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcement of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, *it is not repeated in this column.*

Royal Naval Air Service.

Admiralty, January 2nd.

B. J. Albery granted a temp. commission as Lieut., R.N.V.R., with seniority Jan. 1st.

Chief Petty Officers, W/T.: T. H. Piper, R. H. Methold, E. H. Pollett, L. F. Plugge, H. V. Hamilton, W. Hinsley and O. T. Tidman granted temp. commissions as Sub-Lieuts., R.N.V.R., all with seniority Jan. 1st.

Admiralty, January 3rd.

The under-mentioned entered as Prob. Flight Officers for temp. service, and appointed to "President," additional, for R.N.A.S., all with seniority Jan. 21st: V. G. Austen, A. D. M. Lewis, W. W. Wakefield, E. G. A. Eyre, A. G. Raven, H. P. Guard, N. S. Wright, E. W. Coveney, S. J. C. Ellis, S. A. Randle, O. W. Redgate, T. A. Warne-Browne, G. P. W. Earle and G. Peach.

London Gazette Supplement, January 4th.

Memorandum.—The under-mentioned to be Temp. Lieut.-Col.: Capt. (Temp. Major) C. M. Waterlow, R.E., whilst employed as a Wing Commander, R.N.A.S.; Aug. 21st.

Admiralty, January 5th.

Temp. Warrant Officer (2nd grade) H. C. Mills promoted to Temp. Lieut., R.N.V.R., with seniority Jan. 2nd.

Temp. Flight Sub-Lieut. G. E. Johnson granted temp. commission as Sub-Lieut., R.N.V.R., with seniority Jan. 4th.

Royal Flying Corps (Military Wing).

London Gazette, January 2nd.

Flying Officers.—2nd Lieut. (on prob.) W. E. Jones, S.R.; Dec. 6th. Dec. 7th: Temp. Major M. Elphinstone, A.S.C.; Temp. 2nd Lieut. G. R. Craig, M.C., E. Lan. R., from attd. Lan. Fus.; 2nd Lieut. J. M. R. E. St. Amory, S.R. Dec. 9th: Temp. Capt. (Capt. Res. of Off.) G. D. Begg, M.C., R. Sc. Fus., and to be transfd. to Gen. List; 2nd Lieut. F. W. Keddie, S.R.

Flying Officers (Observers).—Major A. S. W. Dore, Worc. R. (T.F.); Mar. 20th to Nov. 3rd. Temp. Lieut. J. C. O. Dickson, S. Lan. R., and to be transfd. to Gen. List; May 6th.

Equipment Officers (3rd Class).—Temp. 2nd Lieut. R. de Sarigny, Gen. List; Aug. 24th. Dec. 13th: 2nd Lieut. C. B. Carr, Kent Cyclist Bn. (T.F.); 2nd Lieut. (on prob.) J. Ferguson, S.R.; Temp. 2nd Lieut. (on prob.) A. F. Lang, Gen. List; Temp. 2nd Lieut. E. Edwards, Gen. List; Temp. 2nd Lieut. (on prob.) E. C. Rumford, Gen. List.

Supplementary to Regular Corps.—2nd Lieut. W. E. Soper resigns his commission; Jan. 3rd. 2nd Lieut. (on prob.) J. M. R. E. St. Amory is confirmed in his rank. The under-mentioned to be 2nd Lieuts. (on prob.): F. E. Bayley; Dec. 9th. D. Rintoul; Dec. 10th. A. N. Meier; Dec. 11th.

London Gazette Supplement, January 3rd.
Attached to Headquarter Units.

Staff Captains.—Temp. 2nd Lieut. S. M. Wood from a Flying Officer, R.F.C., and to be Temp. Capt. whilst so employed; Oct. 16th. Lieut. R. Whitaker, Rif. Brig., from an Adjt., R.F.C., and to be Temp. Capt. whilst so employed, vice Capt. J. A. M. Lang, Notts and Derby R.; Nov. 5th.

Adjutants.—2nd Lieut. (Temp. Lieut.) F. C. Dixon, Dorset R., Spec. Res., from an Equipment Officer, 3rd Cl., and to retain his temp. rank whilst so employed; Nov. 1st. Capt. R. J. H. Purcell, K.R.Rif. C., and to be seconded, vice Capt. P. Sidney, Northd. Fus.; Nov. 26th. Lieut. F. G. Stammers, R. Suss. R., from a Balloon Officer; Dec. 7th.

London Gazette Supplement, January 4th.

Flight-Commander.—Temp. 2nd Lieut. B. L. Dowling, Gen. List, from a Flying Officer, and to be Temp. Capt. whilst so employed; Dec. 7th.

Equipment Officers, 1st Class.—From Staff Lieuts., and to be Temp. Capts. whilst so employed: 2nd Lieut. C. H. Whittington, S.R.; Dec. 14th. Temp. 2nd Lieut. H. M. Bentley, Gen. List; Dec. 18th.

Scottish School of Fitters.

Chief Instructor (graded as an Equipment Officer, 2nd Class).—Temp. Capt. I. U. D. Truman, Gen. List, from a Flying Officer; Oct. 21st.

Netheravon School of Fitters.

Chief Instructor (graded as an Equipment Officer, 2nd Class).—Temp. 2nd Lieut. A. Latimer, Gen. List, from an Equipment Officer, 3rd Cl., and to be Temp. Lieut. whilst so employed; Dec. 1st.

Memoranda.—2nd Lieut. K. L. Williams, Ind. Army Res. of Officers, to be Temp. Lieut. while serving with R.F.C.; Dec. 1st. 2nd Lieut. (on prob.) F. S. Andrews, from R.F.C., S.R., to be Temp. 2nd Lieut. on Gen. List for duty with R.F.C.; June 29th. The under-mentioned to be Temp. 2nd Lieuts. (on prob.) for duty with R.F.C.: Acting Sergt. Daniel Barron, from R. Highrs., S.R.; Dec. 12th. L. Hamblin; Dec. 28th.

London Gazette Supplement, January 6th.

Memorandum.—The under-mentioned to be Temp. 2nd Lieut. (on prob.): Pte. R. J. Paton, from A.S.C., for duty with R.F.C.; Dec. 8th.

London Gazette Supplement, January 8th.

Park Commander.—Qmr. and Hon. Lieut. (Temp. Capt.) G. Laing, R.F.C., from an Equipment Officer, 1st Cl., and to be Temp. Major whilst so employed; Nov. 1st. (Substituted for the notification in the *Gazette* of Dec. 29th.)

Supplementary to Regular Corps.—The under-mentioned 2nd Lieuts. to be Lieuts.:—Dec. 1st: M. R. H. A. Allen (Temp. Capt.) W. J. B. Curtis, W. M. Pethybridge, B. J. W. M. Moore, M.C., H. A. B. Robb, M.C., G. D. Etches, W. J. Hewitt, T. G. G. Bolitho, W. W. Stenning, R. W. Le Gallais, (Temp. Capt.) H. R. Lecomber, S. Davenport, J. S. D. Harries-Jones, (Temp. Capt.) E. S. Perrin, L. C. Boyd, R. H. Cronyn, S. Allenby. The under-mentioned 2nd Lieuts. (on prob.) are confirmed in their rank: L. H. Gibbon, H. P. Reid, J. T. Rossiter, H. H. Leage, W. H. G. Furnivall, H. D. Lehmann, S. Blackley, C. L. Baldwin, W. E. Nuttall, N. Martin, J. G. Wilson, J. G. Hope, A. G. Griggs, R. Hunt, S. H. Bell. The under-mentioned to be 2nd Lieuts. (on prob.), G. D. Eckardt; Nov. 6th. Nov. 21st: H. L. Tracy, R. S. Bennie. H. W. Wheatly; Dec. 7th. H. R. South; Dec. 10th. Dec. 19th: D. Sutherland, J. T. Menzies, V. A. Stewart, H. T. Leslie, G. O. Lightbourn, J. A. MacKay, A. L. Schario, A. McN. Denovan, Earl S. Meek, C. G. Wood, W. A. Leslie, W. W. Rogers, R. U. Phalen, D. Leishman, G. E. Cushing, A. G. Walwyn, R. L. M. Ferrie.

Aeronautical Inspection Department.

London Gazette Supplement, January 4th.

Assistant Inspector.—2nd Lieut. J. A. O'Brien, Lond. R. (T.F.), and to be Temp. Hon. Lieut. whilst so employed Dec. 11th.

Zeppelin Mail in Greece.

ACCORDING to the Greek Royalist paper *Hesperini*, a Zeppelin appeared over Larissa on January 1st and dropped 15 mailbags, reported to contain correspondence from the Greek Army Corps interned at Gorlitz. There have been rumours for some time of aerial communications between Greece and Germany, and this story appears to confirm them.

Two Zeppelins Reported Destroyed.

IF the latest story is to be credited, Tondern, Schleswig, would certainly appear to be anything but a healthy resting-place for Zeppelins. It will be recalled that at the end of 1915 two Zeppelins housed there were reported to have been accidentally destroyed. According to the *Ribe Stiftstidende*, on December 28th two Zeppelins, both of which had taken part in raids on England, were destroyed in the sheds there by fire, either caused by a short circuit or by the two airships colliding when returning to the shed. A large number of lives are believed to have been lost, but it is difficult to obtain details. The frontier was strictly guarded for some days to prevent information leaking out.

FLIGHT

THE STEEL CONSTRUCTION OF AEROPLANES.*

By GROVER C. LOENING, B.Sc., A.M., C.E., Vice-President of the Sturtevant Aeroplane Co.

THE Sturtevant Aeroplane Co. has recently developed a new type of steel construction for aeroplanes, tests of which have shown that it has many advantages in reliability, lightness and strength that cannot be obtained in wood. For the *fuselages*, rudders and tail surface, methods of using steel have been devised which are remarkably successful.

The construction of aeroplanes has usually involved the use of wooden members fastened by steel fittings, which, due to the greater stresses involved in larger aeroplanes, have gradually become more and more bulky and complicated. A study of the construction of large-sized aeroplanes at the present time reveals that the weight and cost of manufacture of these metal fittings has become a much larger item than was formerly the case.

A departure from the usual wooden construction of aeroplanes that has been used in a few instances is the application of steel tubing, not only in the bracing members and struts, but also in the wing spars and in the *fuselage* construction. A study of this development has shown definitely that steel tubing construction is heavier than the customary wooden construction for the same strength. In addition, it has been found that the joints are difficult to make in steel tubing construction, requiring a great deal of welding and brazing into suitable sleeves, with the general result that the joint is heavier and not as reliable as desired because of the indeterminate nature of a welded or brazed joint.

It has been clear, however, for some time that steel construction was desirable for aeroplanes, not only in making them more mechanical, more durable, fireproof and more weather resisting, but from the fact that steel, as a structural material, has in all branches of engineering been found more reliable and better adapted to manufacturing in quantity.

The problem confronting the Sturtevant Aeroplane Co., therefore, was to apply the principles of steel construction that had been developed with such success in structural, shipbuilding, engineering, automobile and machine tool work. It was apparent at the outset that what had been done in applying steel to the construction of aeroplanes required considerable development and modification in order not to increase the weight of the machines and to simplify the fitting of members to each other.

Entirely on its own initiative, therefore, this company decided to use in aeroplane construction structural steel sections of angles, channels, I-beams and the like, with riveted and pinned joints, exactly as is the practice in the most refined civil engineering of structures. The only data available to guide this new development was what had previously been obtained by the author in his experiments with this type of construction in 1912 and 1913.

* From *Aviation*.

Several kinds of metal-working tools, metal-forming machines, angle and channel benders, cornice breaks and powerful presses, were available for this work at the Hyde Park plant of B. F. Sturtevant Co. After experimenting with the size and strength of various members and with different types of riveted joints and pin-connected joints, designs were drawn up for the *fuselage* of the Sturtevant tractors, consisting of *longerons* of steel angles and struts of steel channels, with a few special rolled sections peculiarly well adapted to the work.

The computations for the size of all these members were made following the best engineering practice, on their bending moments, moments of inertia, reliability of fixing, &c. After the sections had been established by calculations, exhaustive tests were made on the strength of the various members at the Massachusetts Institute of Technology.

The values of strengths thus determined checked remarkably closely with the computed strength of the members, giving a most striking illustration of the accuracy with which steel members can be designed. The stresses on the *fuselage* induced by the air loads, tail skid loads and whip of the tail being determined, the *fuselage* was constructed with suitable safety factors.

In the flying tests of the various Sturtevant steel aeroplanes conducted recently, and in several tests of severe landings that have been made, it has been demonstrated that both this design and construction fulfil in every way the functions called for.

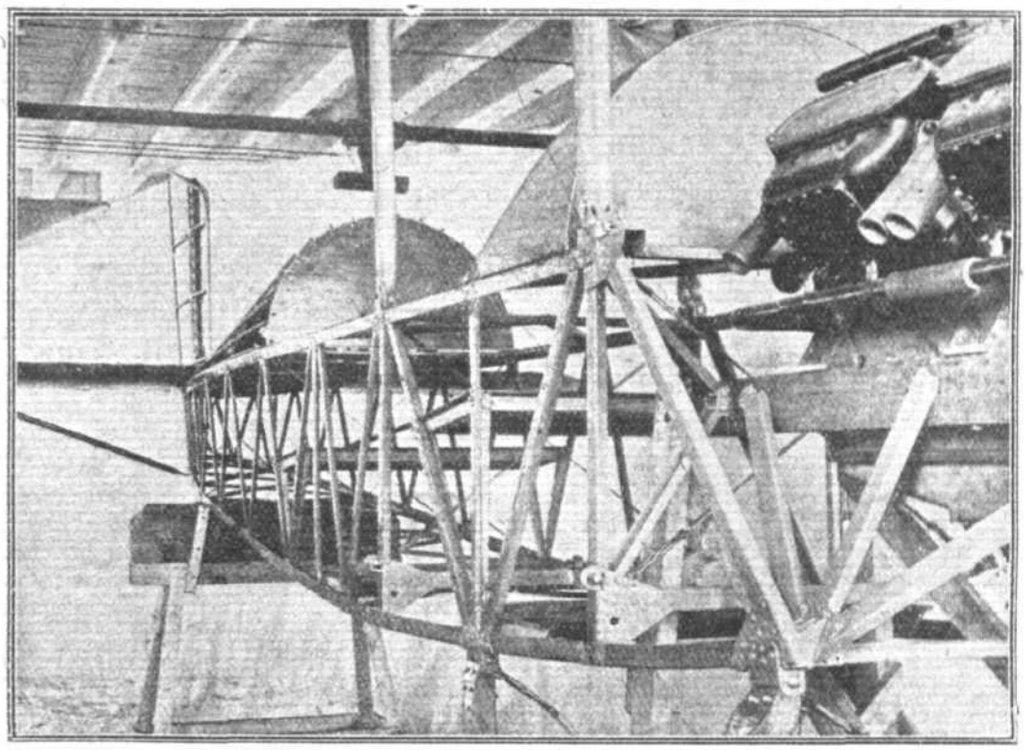


Fig. 1.—Steel construction in *fuselage*.

In addition to the construction of the *fuselages* themselves entirely of steel, the engine beds of these aeroplanes are also made of steel, and have definitely demonstrated a similar reliability and correctness of design.

Furthermore, it was decided to construct surface frames of structural steel, and as a first step towards this end the flaps of the elevator were made of steel channels and angles. After some preliminary experimenting, a method of constructing these simply was devised, and upon completion it was found that these flaps were actually lighter, more rigid and much more serviceable than those ordinarily made of wood or of steel tubing.

This was followed by making the rudder and wing flaps also of steel, and lately the Sturtevant Co. has extended this to the construction of the wing itself entirely of structural steel sections. The steel wing construction has received severe tests and thorough demonstration.

An account having thus been given of the general nature of the development of this new type of construction, the various features may be taken up in greater detail. To simplify the consideration of this matter as much as possible, two instances in which this construction is used will be taken up.

Fuselage Construction.

The framework of the *fuselage* of Sturtevant Model A tractor battleplane actually weighs 165 lbs., inclusive of engine bed, which is entirely of steel and pin connected to the main frame, and also inclusive of all the bracing in the *fuselage*.* The loads that it is necessary for the *fuselage* to carry are the whip of the tail on landing, the positive and negative air loads and the tail-skid load.

It is customary in designing to compute the value of all these loads and to design the frame to withstand them all with a factor of safety of at least 8 in the case of the air loads, and in the case of the tail-skid load with a factor of safety of at least 4. This latter figure has come to be considered quite strong enough for the tail-skid load, as the condition under which the maximum load is imposed is when the machine is slowing down on landing with the motor stopped—it being obvious that, due to its height, any thrust on the propeller greatly reduces this load.

The tail-skid load of this machine lies between 350 and 400 lbs., due to the position of the landing gear wheels at the front, and varies with the load carried on the machine. On the smaller sized aeroplanes this load is usually between 50 and 150 lbs., so that it is apparent that the function of the tail skid and the strength required of the *fuselage* have become very much greater in this larger type of aeroplane. This load, as a matter of fact, has become the governing feature in the strength of the *fuselage* and induces stresses far greater than the air loads.

From theoretical considerations and practical experience of such construction, the design of a wooden *fuselage*, with metal fittings, using ash in order to obtain the required tension strength, on aeroplanes approaching this size, indicates a weight of over 200 lbs., of which the fittings and wires alone would weigh about 60 lbs.

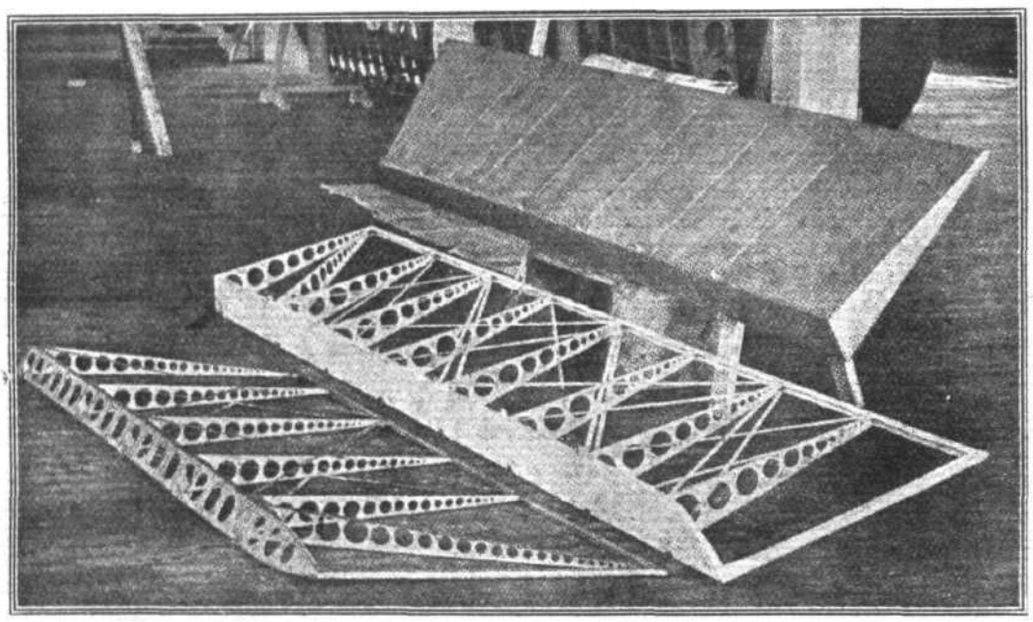


Fig. 2.—Steel construction in wing and elevator surfaces.

The accompanying photographs indicate the manner in which the *longerons* of the *fuselage* and the channel sections, struts and cross braces are fastened to each other directly, without the addition of anything at all in the way of extra fittings, the members being placed simply one on top of the other and riveted with the required number of rivets to develop the strength required of the member. This feature alone has in this *fuselage* saved in one stroke about 60 lbs. in weight. In addition, the time required for the manufacture and assembling of metal fittings ordinarily necessary at each joint is entirely eliminated, and it is possible to assemble the frame in a very short time.

It is, of course, most reasonable to suppose that this steel construction as it develops will involve many minor changes in the method of fastening and details.

In the Model A tractor, taken as an example, the entire *fuselage* of which is constructed in this manner, actual flying and landing tests have been conducted frequently since the first week in December, 1915. Severe landing and taxi-ing over rough ground have demonstrated the reliability and correctness of this construction, which has withstood all proper stresses induced in it without the least sign of being in any way inadequate. It is maintained that this in itself is a remarkable indication of the value of this construction, in that the design of frame has required no alteration and actually has revealed not the slightest sign of weakness under severe tests.

The process of manufacture of these parts is exceedingly simple, in that the cold rolled steel delivered by the mills in the exact widths necessary for the different members is received at the factory marked and cut to the lengths of the members. These are lightened in a few minutes by having the lightening holes punched out in a gang punch. The members are then bent up or pressed in a die to the angle or channel shape desired, the member then taking its completed form and is ready for attachment to neighbouring members without the necessity of any extra fitting having to be made.

In the future it may be possible to purchase channels and angles of the sizes required from steel manufacturers, or, as planned by this Company, for quantity production of aeroplanes, it would be necessary merely to have then made in the large metal-forming presses, with dies for blanking out and pressing up the members in one operation.

It is clear, therefore, that for quantity production where a die would be used the manufacture of a member of the *fuselage*, with all its lightening holes and rivet holes complete in itself and with no extra fittings required, could be made in a few seconds producing a great saving of both time and expense.

When this is compared to the former process of, first, sawing up the lumber, then cutting it to size, then trimming it, then finishing it, and after that being compelled to make an additional fitting, expensive, complicated and heavy, to fasten the member to its neighbour, it becomes apparent that the manufacturing advantages of using this pressed steel construction is actually of the very greatest fundamental importance to the industry, exactly as it has proven to be in almost every other industry.

The disadvantage of steel construction, often cited, of crystallisation, &c., is met by using special pin-connected joints with shock absorbing washers to take up the vibration of the engine bed, and by using a vanadium steel, which is considered proof against crystallisation.

In considering this it must be borne in mind that the metal fittings on wooden *fuselages* are also subject to crystallisation, and the absorption of vibrations by the wood is not any more advantageous than the absorption of vibrations by proper pin-connected joints in the correct steel design.

Rudder and Elevator Construction.

Another instance of the use of steel construction is in the frame work of the surfaces themselves as used and demonstrated in the aeroplanes above referred to, the rudders, elevator surface and *aileron* surfaces of which are constructed of steel frames covered with linen.

The stresses on members of this kind are not clearly definable, and the suitability of this construction has required considerable experimenting. This, however, has finally resulted in the adoption of the type of construction here illustrated. Briefly described, this construction consists in forming the ribs of a steel channel section with flanged

* It is to be noted that this refers to a very large aeroplane of the "battleplane class," and on the smaller Sturtevant reconnaissance type the *fuselage* is much lighter.

lightening holes readily pressed out in great quantities by suitable dies and fastened to structural steel spars.

Surface construction of this kind actually shows that it has weight of less than ½ lb. per square foot. This is very much less than is obtainable with the ordinary wood type of construction for the same strength, and, in addition thereto, the steel construction gives an excellent rigidity and mechanical appearance to the surface which is most pleasing.

This method of aeroplane surface construction has also been demonstrated structurally and from a flying standpoint on the Sturtevant aeroplanes.

Wing Construction.

The success and ease of manufacture of this steel construction of rudder and flap surfaces has led to the investigation of the possibility of constructing the aeroplane wings by a similar system. Experiments were, therefore, conducted on various methods and sizes of ribs, and finally an entire wing section of this construction was made and covered. This section was fixed on a span of 8 ft. and tested in the presence of several witnesses, with sandbag loading, in order to determine the suitability of the ribs and spar construction to withstand the air loads. The frame was actually made of exactly the same weight as a wooden wing to withstand the same load, or 300 lbs. distributed on the 60 square ft. of wing section, the frame being designed to have a safety tactor of 8. Numerous sandbags were distributed on the wing according to the usual method of testing. On top of this were superimposed a great number of very heavy lumber boards, and, finally, in order to obtain a breaking load, it was necessary for three of the witnesses present to stand on top of this load.

When there had been imposed a total of 2,550 lbs., the wings slowly began to fail by the bending of both of the spars exactly at the point at which the bending moment diagram indicated the least strength factor. The breaking load of 2,550 lbs., where the wing section was designed to carry 300 lbs., indicated a safety factor of over 8. This entire test is in itself an unusually clear instance of the accuracy with which steel construction may be designed.

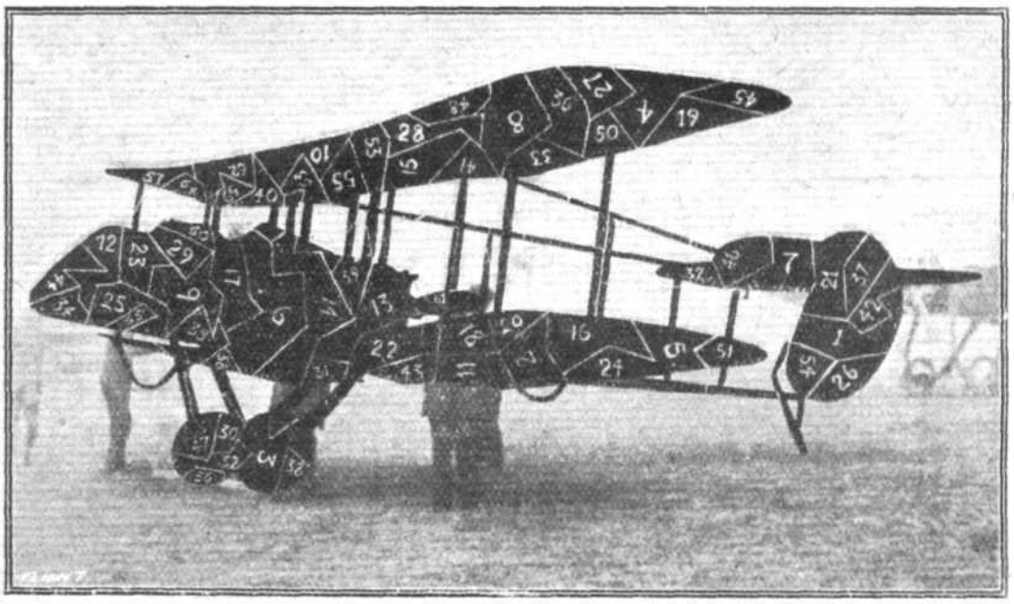
Summary.

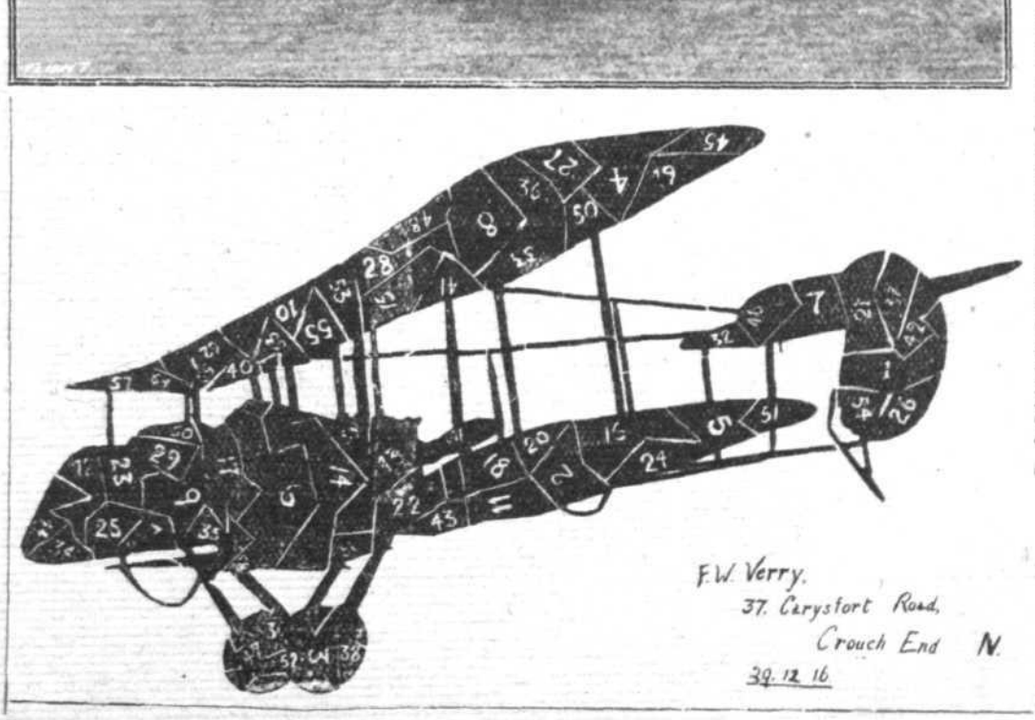
The *fuselage* construction and the surface construction for rudders, elevators, &c., have proven to be highly satisfactory and have been adopted as standard after very careful study by the Sturtevant Co.

The ease with which riveted or pinned joints can be made between angles and channels and the excellent fit of the different members to each other without any extra fittings is nothing short of a revelation in aeroplane construction. Military aeroplanes that can be left out of doors and naval aeroplanes that can ship big seas without "spoiling," can be attained by the use of this new type of steel construction.

While a difficulty is foreseen in adapting wood to the construction of huge aeroplanes of the battleplane class, with steel it is readily possible and even advantageous to grow to larger sizes.

"FLIGHT" PRIZE AVIATION JIG-SAW PUZZLE.





F.W. Verry.
37. Carysfort Road,
Crouch End N.
39.12.16

The only actually correct solution received of the above puzzle, which was published in our Christmas Number, December 14th, is from Mr. F. W. Verry, 37, Carysfort Road, Crouch End, N., and a cheque for one guinea has been duly sent to him. Several near attempts were made, but this was the only faultless solution. In order that our readers may judge its accuracy, we reproduce on this page, firstly a print from the original photograph as divided off before cutting up into pieces, with an identifying number for each part, and below this photograph is reproduced the solution exactly as sent by Mr. Verry.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British. *General Headquarters, January 5th, 8.36 p.m.*

"There was considerable aerial activity yesterday. Successful work was carried out by our aeroplanes in conjunction with our artillery. Two of our machines are missing."

General Headquarters, January 6th, 8.40 p.m.

"On the night of 4th–5th and again yesterday our aeroplanes attacked with bombs a number of places of military importance behind the enemy's lines, and obtained good results.

"Much successful work was carried out during the day in co-operation with our artillery."

Admiralty, January 6th.

"On Jan. 4th a squadron of British naval aeroplanes attacked the railway bridge over the Maritza River at Kuleli-Burgas. One span of the bridge is reported to have been completely wrecked."

General Headquarters, January 8th, 8.35 p.m.

"Yesterday a number of enemy batteries were effectively engaged by our artillery in co-operation with our aeroplanes. Many places of military importance behind the enemy's lines were successfully bombed, and a number of fights took place in the air. Two enemy machines were driven down in a damaged condition. Two of our machines are missing."

French. *Paris, January 4th.*

"Shortly before 5.30 p.m. a German aeroplane dropped two bombs on Compiègne. A woman was injured. No damage was done."

Paris, January 5th.

"Last night 20 of our aeroplanes carried out various bombardments. The enemy aerodromes of Matigny, Haucourt, Flez and Bernes, and the railway stations of Rouilly, Athies and Villecourt, and the cantonments of Roye received numerous bombs."

Paris, January 6th.

"On the night of January 4th–5th our bombarding squadrons dropped bombs on the aerodrome of Grisolles and the railway station and hutments of Guiscar, where four fires and several explosions were noticed. Last night enemy bivouacs south of Spincourt, the ammunition dumps at the farm of Longeau and the railway station of Mesnil-St. Nicaize were also bombarded."

Paris, January 7th.

"During the day of Jan. 5th Sub-Lieut. Delorme shot down at close range a German aeroplane. The machine was damaged and compelled to come to ground in our lines, close to Auves. The airmen were made prisoners. This is the fifth machine brought down by this pilot. During the night of Jan. 6th–7th one of our squadrons bombarded the aviation grounds at Haucourt and Matigny, the station at Arcigny, the enemy cantonments at the Liaucourt Wood, and the depôts at Attichy."

Belgian. *Havre, January 6th.*

"The persistent bad weather has completely stopped the work of the Belgian airmen."

Russian. *Petrograd, January 3rd.*

"*Western Front.*—Enemy aeroplanes have displayed considerable activity and have dropped bombs at various points. One of the machines was brought down by our artillery fire near the village Iva (south-east of the Vishnevsk Lake). The aviators (an officer and a private) were taken prisoners. In the region of Porskaia Vulka (south-east of Kovel) our aviators brought down two enemy aeroplanes. Both the machines were smashed, and the four aviators killed by the fall."

Petrograd, January 7th.

"In the region of the town of Retchki (north-east of Veleiki) an enemy aeroplane landed. The aviators, an officer and a private, were taken prisoners."

Petrograd, January 8th.

"Our aviators dropped bombs on Kovel, in the village of Goloba, 30 versts (20 miles), south-east of Koval Station, Zablotze, west of Brody, and the hamlet of Jasenoff, south-west of Brody."

Italian. *Rome, January 8th.*

"On the Trentino front there have been reconnoitring and aerial fights.

"During the night of Jan. 5th–6th an Italian aeroplane flew over Trieste and returned along the coast. Two hundred kilogrammes (440 lbs.) of explosives were dropped upon the station at Nabresina, and in the region of Mont Querceto (Hermada). The aeroplane safely returned to its base in spite of violent fire from the enemy's batteries."

German. *Berlin, January 8th.*

"In the course of successful aerial engagements, and by means of our anti-aircraft guns, the enemy suffered the loss of six aeroplanes."

Bulgarian. *Sofia, January 1st.*

"Our aeroplanes successfully dropped bombs on enemy troops north-east of Larine."

Sofia, January 2nd.

"In the region of Seres and Drama enemy airmen displayed activity without result."

Sofia, January 6th.

"There is growing intensity of artillery fire and great aerial activity along the whole Macedonian front, especially in the Vardar Valley. Near Ghevgheli we brought down a hostile aeroplane, the British pilot of which was made prisoner."

Sofia, January 7th.

"In the bend of the Cerna the airman, Sub-Lieut. Brandek, brought down his second captive balloon, which fell in flames near Negochani."

The Royal Flying Corps Club.

THE formal opening of the club provided in Bruton Street, Berkeley Square, by the generosity of Mr. W. C. Bersey, for officers of the Royal Flying Corps, the Directorate of Military Aeronautics, &c., took place on the 4th inst. The idea of the club, which owes its origin to a suggestion of Mrs. Allhusen, who is working in connection with the R.F.C. hospital in Bryanston Square, is that flying officers who are invalided home can have a place where they can live in comfort and from where they can go out for treatment.

The chairman of the Executive Committee is Lieut.-Gen. Sir David Henderson, D.S.O., and among other supporters of the scheme are Brig.-Gen. Salmond, Lieut.-Col. W. W. Warner, Lieut.-Col. Holt, Lieut.-Col. C. F. Lee, Mr. Bersey and Mr. Percy Simmons, L.C.C., while the Club Committee consists of Brig.-Gen. W. S. Brancker (chairman), Lieut.-Col. W. W. Warner, Lieut.-Col. C. F. Lee, Major E. G. R. Lithgow, and Capt. H. Tomlinson, M.C. The Secretary is Major R. W. Morley.

The club premises include accommodation for 22 resident members, and there are comfortable smoking, reading and writing rooms, which are likely to be much appreciated by R.F.C. officers who are undergoing hospital treatment or are convalescent.

Air Work in Daylight Raiding.

DESCRIBING the big raid south-east of Arras on January 6th, the *Times* correspondent at the British Headquarters says :—

"Our airmen co-operated with their usual audacious skill. They flew in coveys over the German positions. One pilot, to confirm a first impression, came down to within a few hundred feet of the German trenches; and it should be remembered that on this part of the Front the enemy's defences are every bit as formidable as they once were on the Somme. The light was not so very good, either. It was really against accurate observation. All, for instance, that could be seen by observers of our artillery work was the flashing and glowing of the shells bursting in a haze. Nevertheless, the spotting by our airmen for our artillery was wonderfully well done; as the infantry found when they 'went over.'"

U.S. Army Buys an Aerodrome.

THE United States Army authorities have recently purchased 1,700 acres of ground between Back River and Hampton, Va., on the lower Chesapeake Bay, near Fort Monroe, for the purpose of laying out what, it is hoped, will be one of the finest aerodromes in the world. The ground, which has cost $290,000, is to be called Langley Field, and it is proposed to ask Congress to allow $1,500,000 to be spent on buildings and equipment.

U.S. Want Separate Flying Corps.

IN the opinion of Brig.-Gen. G. P. Scriven, Chief Signal Officer of the United States Army, the time has come for the separation of the aviation section from the Signal Corps, and the formation of a properly constituted Flying Corps. A report by General Scriven outlines a plan for the formation of seven aero squadrons for the Regular Army, twelve squadrons for the National Guard and five for the defences of both coasts, besides aerostatic units for the mobile army and coast artillery.

Models

A Scale Tractor Biplane.

IN sending along two photos. of a scale tractor biplane he has built, Mr. F. J. Mabb, Secretary of the Leeds and District Model Aero Club, says :—

"Having met with some success with scale models, the first being a model of the 80 h.p. Blackburn monoplane, I decided to construct another—a tractor biplane—incorporating various ideas of my own into the construction. One is the use of wood and wire in conjunction, which makes a light and strong job and will stand up to the rough usage of model flying much better than all wood.

"I have made it a point to do away with use of screws and tacks as much as possible, practically all joints being bound with silk thread and varnished. Only four screws are used, these holding the wood faceplate on to the *longerons* which carry the motor.

"The best flight up to writing does not exceed 20 yards, the weather having not permitted any chance to give the model a fair trial, although at the best I don't suppose I shall get more than 100 yards, and perhaps not even that, but I think that a few yards' free flight from a model of this type is far more satisfactory than even half a mile from some so-called models. Even if one does have a smash every now and again, you have the consolation of repairing it, besides having found out the weak points. Of course it is not wise for novices to start off on scale work, as it would probably only mean failure and throwing the whole thing up in disgust, but it's a great pity more experienced model makers don't take the type up. They would be surprised at the amount of knowledge they would gain.

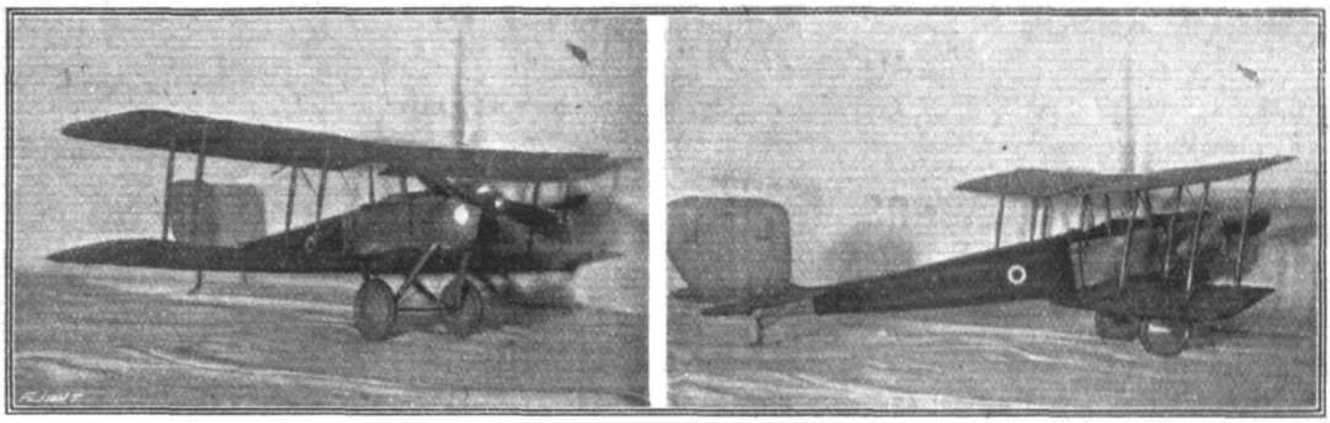
"The dimensions of this model are as follows :—Span, 42 ins. ; chord, 6¼ ins. ; overall length, 39 ins. ; complete weight, 28 oz. ; carrying a load per sq. foot of 8 oz. ; tractor screw, 12½ ins. diam. of 15½ pitch, running at 2,000 r.p.m. for 30 secs. ; this screw is of the built-up type, three laminations of dark walnut and two of satin walnut. The planes are double surfaced, with a gap of 7½ ins., set at a stagger of 2½ ins., 8 gap struts, angle of incidence 2½ deg. ; chassis, the usual vee type, fitted with 3½-in. wheels. These are turned from wood with aluminium discs fitted on the outer sides. The body is covered one-third with the same metal, a beaten cowl covering the motor, which consists of five cogs, all one size, four of these carrying the skeins of rubber, which are four strands of quarter strip per skein ; 600 turns can be got when the rubber is lubricated. Tail members are of piano wire, single surfaced.

"The centre of gravity has been placed well forward by making the rear of the body extremely light, at the same time very strong.

"The planes are made so as to be quickly dismantled for carrying, being constructed on similar lines to the full sizer.

"All struts are of streamlined form to do away with as much resistance as possible."

Mr. Mabb would be pleased to hear from any aero-modellists in the Leeds district and to give them any assistance possible. His address is 4, Bk. Greenmount Terrace, Beeston Hill, Leeds.



Two views of Mr. F. J. Mabb's scale model tractor biplane.

UNAFFILIATED MODEL CLUBS DIARY AND REPORTS.

Club reports of chief work done are published monthly. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Finsbury Park and District (66, SOUTHVIEW RD., HORNSEY).

SPECIAL NOTICE.—The club has been offered by an anonymous donor some valuable prizes for competition if the active membership is brought up to 20 by Whitsuntide. The secretary would, therefore, be pleased to hear from any person who is desirous of becoming a member.

Monthly Report.—Again the past month's work has been rather below the normal owing to the bad weather, but the quality of the flying has shown a marked improvement. The club's records for tractor monoplanes, h.l. and r.o.g., have been increased to 73 seconds and 55 seconds respectively, the former by Mr. A. Richards and the latter by Mr. C. J. Burchell. December 2nd was windy, but some good flying was done by Messrs. Richards, Rayner and Coleman. The 9th was much better, but only Mr. Rayner and his brother, in khaki, appeared with models. Drummer Rayner's model "smashed-up" on first flight owing to a nose dive. The former's model was flying consistently throughout the afternoon, doing good durations. The 16th was foggy, and the 23rd was wet and windy. On Boxing Day, one of the most succ ssful meetings of the club took place. The morning was cold and frosty, with a slight ground mist, and was ideal for flying. The competition for Mr. A. E. Jones' prize money had been arranged, and was flown without a hitch. Two flights had to be made by each competing model, a h.l. and a r.o.g. The result was as follows :—Mr. A. Richards first, w th 98 points ; Mr. F. E. Rayner second, with 93 points ; Mr. C. J Burchell third, with 72 points ; and Mr. E. Coleman with 60 points. The last-named had extremely hard luck throughout the contest. Mr. P. J. Poultney acted as official timekeeper and observer. During the morning many flights of 60 seconds and over were made by the various models, and the records mentioned previously were also made. All the models in use were hollow-spar tractor monoplanes, and were mostly four-footers. A junior, R. E. Stansell, was flying a small model very well. The 30th was rather windy, but nevertheless the attendance was not small. One of the best flights of the afternoon was made by Mr. E. Coleman's machine, when it flew a distance of nearly 320 yards. Another good flight was made by Mr. Rayner's model. On this occasion it made a swift steady climb to a good altitude, and then "set off" for a journey of about 350 yards. The steadiness of this machine was remarked by everyone present. Mr. Richards' record-breaker was out, but for some unaccountable reason, it failed to make very long durations. Messrs. Burchell (sen.) and Burchell jun.) were out with their light weight monos., but they did not stand such a good chance in the wind as the heavier machines. All the meetings recorded above have been held at Parliament Hill Fields, Hampstead. Just recently two scale models (not flying) have been completed, a Morane-Saulnier by Mr. Rayner and a Nieuport "Scout" by Mr. Richards. Yet another member has to be added to the Club's Roll of Honour ; Mr. W. Hardinge has now joined the R.A.M.C., and is stationed at Blackpool. Mr. Richards commenced his duties as treasurer on January 1st, 1917.

U.S. Navy to Try Kite Balloons.

ACCORDING to a statement before a Committee of the House of Representatives, the American warships "Nevada" and "Oklahama" are being fitted up for the purpose of testing kite balloons for spotting purposes during nava manœuvres to be held at Guantanamo. The kite balloons will be 75 to 80 ft. long, 30 ft. in diameter and carry two men. They will be inflated with hydrogen from a tank on board the ship.

SIDE-WINDS.

STILL further changes have taken place at the extensive premises of H. M. Hobson, Ltd., 29, Vauxhall Bridge Road, since last summer. Besides the addition of further machinery to the old premises, a building at the back has been acquired and converted into a remarkably well equipped workshop. Fortunately the levels of the floors in this building coincided with those of the main building, so that doors have been made leading from one to the other, giving convenient access to all parts. One section has now been set aside entirely for turning out Hobson plugs, the rest being devoted to the Claudel-Hobson carburettors. On the ground floor, what was formerly the car-washing shop is now fitted up with some very fine machinery for producing large parts. The stores have also been enlarged, whilst replete general offices, a drawing office, and a workers' mess-room complete the improvements.

IN spire of the restrictions on paper and printing, Hazell's Annual and Almanack for 1917 has nearly doubled in size on its predecessor, while its usefulness, needless to add, has been increased in proportion. There are several special articles dealing with war subjects, including eight pages of maps. A feature is a 16-page summary of aeronautical work in 1916, in which a great deal of useful information regarding the principal air fights and raids, the raids on England, Zeppelin losses, world's records, &c., are tabulated in very convenient form. The sections on the British Dominions and Colonies and on foreign countries have been entirely rewritten, and embody a great amount of statistical information which makes the book invaluable for those who are determined to take full advantage of any and very opportunity which offers in trade after the war. The book, which runs to some 850 pages, is now published under the joint proprietorship of the Oxford University Press and Messrs. Hodder and Stoughton, Falcon Square, E.C., and costs 3s. 6d. net.

UNDER "New Companies Registered" in last week's "FLIGHT" the latest Ruffy-Baumann development was recorded. Not only does the Ruffy, Arnell and Baumann Aviation Co, Ltd., take over the school at Hendon, but also the Ruffy-Baumann manufacturing plant, which, despite the difficulties that have had to be contended with, has a most creditable record. Under the new conditions and with greater facilities there is no doubt that the output will be considerably amplified. Although, naturally, the firm are not throwing too much light on their plans for the future, it may be said that both the school and the factory are to be expanded to a scale that has not hitherto been possible, and some considerable developments will doubtless be forthcoming.

GOOD test pilots are scarce, and for that reason many will be more than a little interested to hear that M. René Desoutter, who has been associated with the British Caudron Co. for some time past, has, we understand, modified his connection with that firm in so far as in future he will not be exclusively engaged in putting Caudrons through their paces, but any other makes of machines he will be free to put through their acceptance tests. With such a fine reputation as a steady and skilful tester, which Desoutter has, he will probably find that the future will contain but little leisure for him, and those who have cast longing eyes on him should lose no time in booking him.

THE little note in last week's "FLIGHT" regarding Messrs. Brown Brothers' "Trials of a Sportsman" calendar resulted in such a rush of applications that the stock disappeared in record time. Unfortunately it is impossible to reprint it, and so those who have not received one by now will have to make up their minds to be disappointed unless they can persuade a friend who has been more lucky to "lend" their copy.

EMINENTLY practical in all their publications, the Lodge Sparking Plug Co., of Rugby, have got out a little booklet embodying a system of locating faults in a petrol engine. The troubles likely to be met with are arranged in sections such as "starting," "stopping," "missing," &c., and under each are tabulated the symptoms, what to examine, what to look for as the cause of the trouble and the remedy. It is a splendid idea, and, being well carried out, provides a simple and quick method of locating faults in emergencies. Any reader who would like to have a copy should write to the Lodge Co. at Rugby for one.

The Bucharest Zeppelin Raid.

ACCORDING to the *Pester Lloyd*, and the story is therefore to be accepted with all reserve, the number of civilians killed at Bucharest by Zeppelin bombs exceeds 2,000

PUBLICATIONS RECEIVED.

The New Hazell Annual and Almanack, 1917. By T. A. Ingram, M.A., LL.D. London: Henry Frowde, and Hodder and Stoughton. Price 3s. 6d. net.

The Aeroplane Speaks. By H. Barber, A.F. Ae.S. (Capt. R.F.C.). London: McBride, Bast and Co., Ltd. Price 5s. 6d. net.

Calendar, 1917. The British Aluminium Co., Ltd., 109, Queen Victoria Street, E.C.

Calendar, 1917. Brown Brothers, Ltd., Great Eastern Street, E.C.

Calendar, 1917. General Motors, Ltd. (Buick Cars), 135-136-137, Long Acre, London, W.C.

Desk Calendar, 1917. Cellon, Ltd., Broad Street House, New Broad Street, London, E.C.

IMPORTS AND EXPORTS, 1915-1916.

AEROPLANES, airships, balloons, and parts thereof (not shown separately before 1910). For 1910 and 1911 figures, see "FLIGHT" for January 25th, 1912; for 1912 and 1913, see "FLIGHT" for January 17th, 1914; for 1914, see "FLIGHT" for January 15th, 1915; and for 1915, see "FLIGHT" for January 13th, 1916:—

	Imports.		Exports.		Re-Exportation.	
	1915.	1916.	1915.	1916.	1915.	1916.
	£	£	£	£	£	£
January ...	20,382	1,509	435	6,399	13,706	—
February	380	6,444	138	30,693	18,823	—
March ...	280	3,388	7,218	17,872	5,090	7
April ...	2,189	3,383	23,986	22,608	275	3,783
May ...	178	1,986	12,530	26,165	8,250	300
June ...	5,469	4,986	3,730	59,287	2,400	—
July ...	1,240	2,072	13,372	12,932	—	—
August ...	664	2,583	36,276	13,555	247	420
September	536	1,076	4,908	36,048	—	—
October ...	1,344	952	17,702	9,289	—	8
November	1,859	7,406	21,979	12,858	—	—
December	1,293	6,335	28,192	43,481	—	—
	35,814	42,120	170,466	282,187	48,791	4,518

Aeronautical Patents Published.

Applied for in 1915.

Published January 11th, 1917.

17,445. N. PEMBERTON-BILLING. Aeroplanes.
17,594. A. AUSTIN. Screw propellers.
17,736. F. O. CREAGH-OSBORNE, A. J. HUGHES AND H. HUGHES AND SON, LTD. Magnetic compasses.
17,766. A. CAIRNS. Propellers.
17,954. MARCONI'S WIRELESS TELEGRAPH CO. AND C. S. FRANKLIN. Means for controlling speed.

Applied for in 1916.

The numbers in brackets are those under which the specification will be printed and abridged, &c.

Published January 11th, 1917.

4,635. F. HENKLE. I.C. engines. (102,679.)
8,435. J. S. PHILLIPS. Aeroplanes. (102,692.)

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